A CHILTON PUBLICATION

the Iron Age

NATIONAL METALWORKING WEEKLY

June 4, 1953

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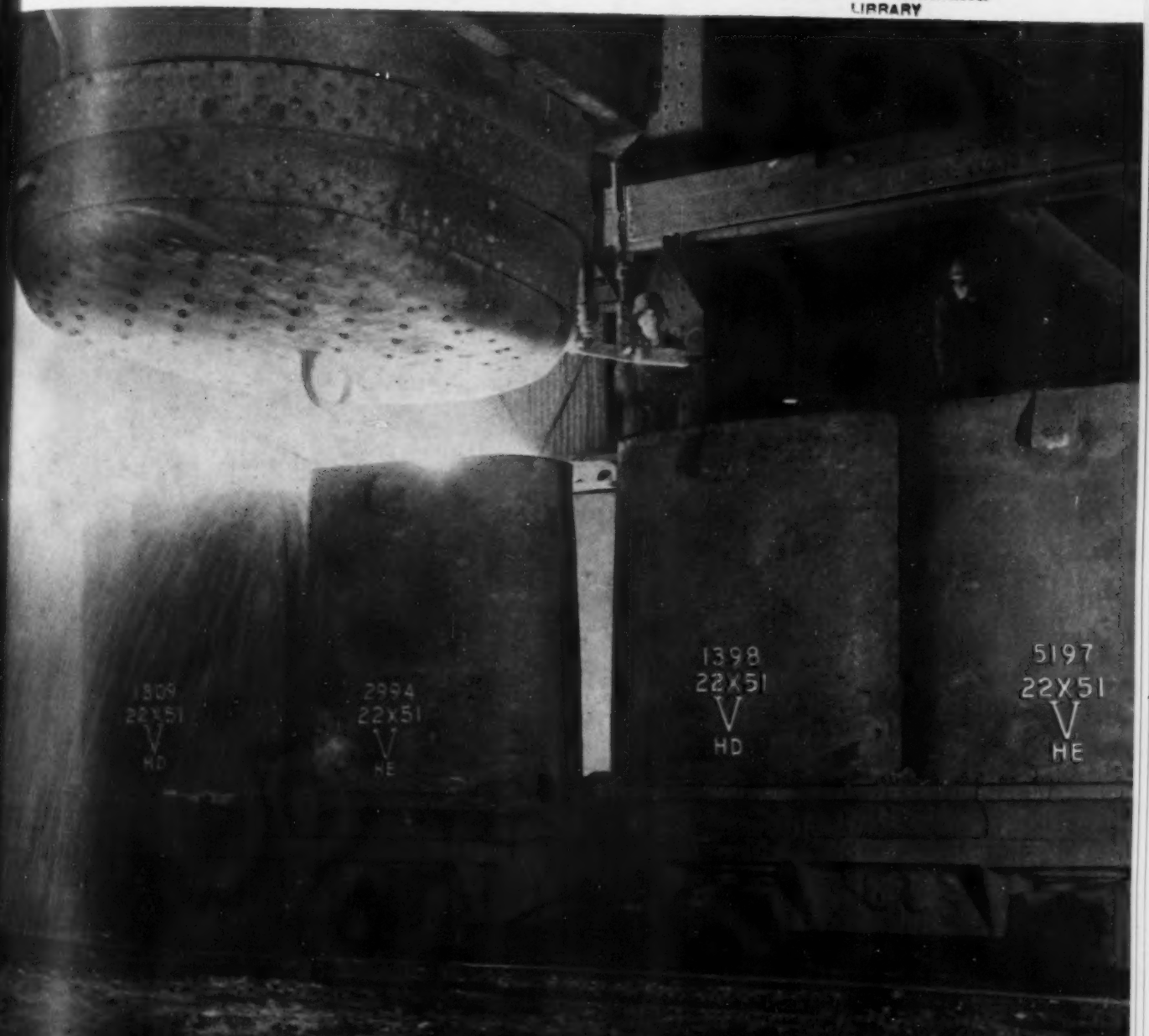
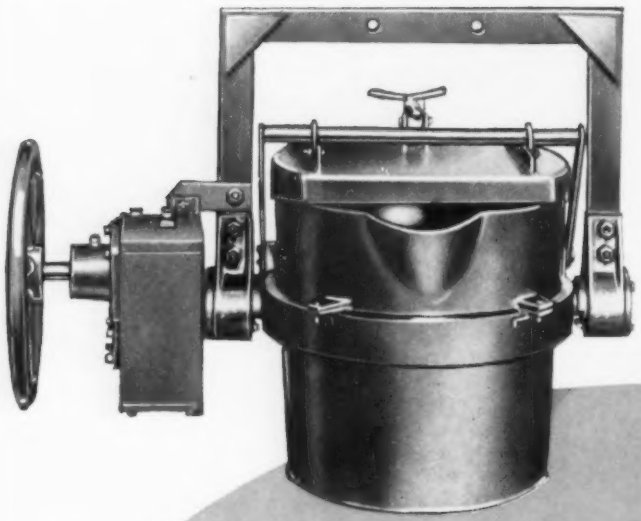


WHITING

LADLES



COVERED TROLLEY LADLES—Heavy steel plate bowls; air cooled trunnions for trouble free operation. Anti-friction bearings. Improved design minimizes hand-wheel loads. Furnished with or without covers. Capacities (Iron) from 465 to 1400 lbs.

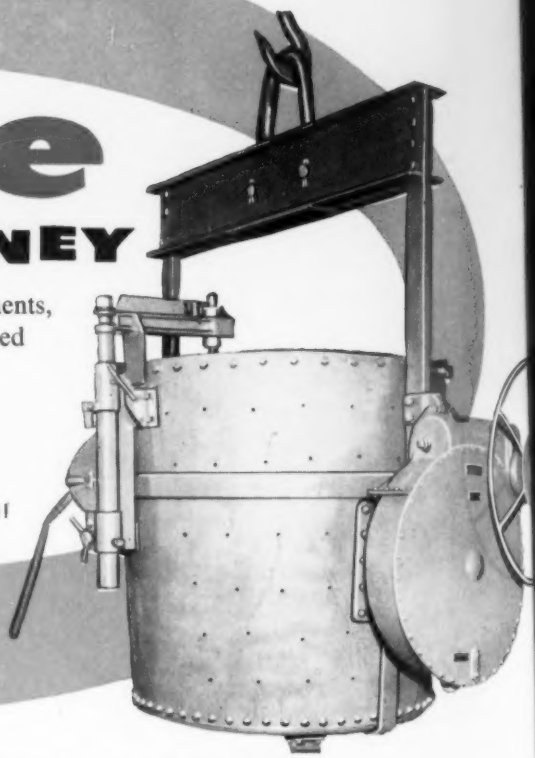
more
FOR YOUR MONEY

Whiting Ladles, built to meet your special requirements, provide outstanding *exclusive* advantages. Each is designed for greater accuracy and safety, easier control, lower maintenance and longer life.

WHITING CORPORATION

15601 Lathrop Avenue, Harvey, Illinois

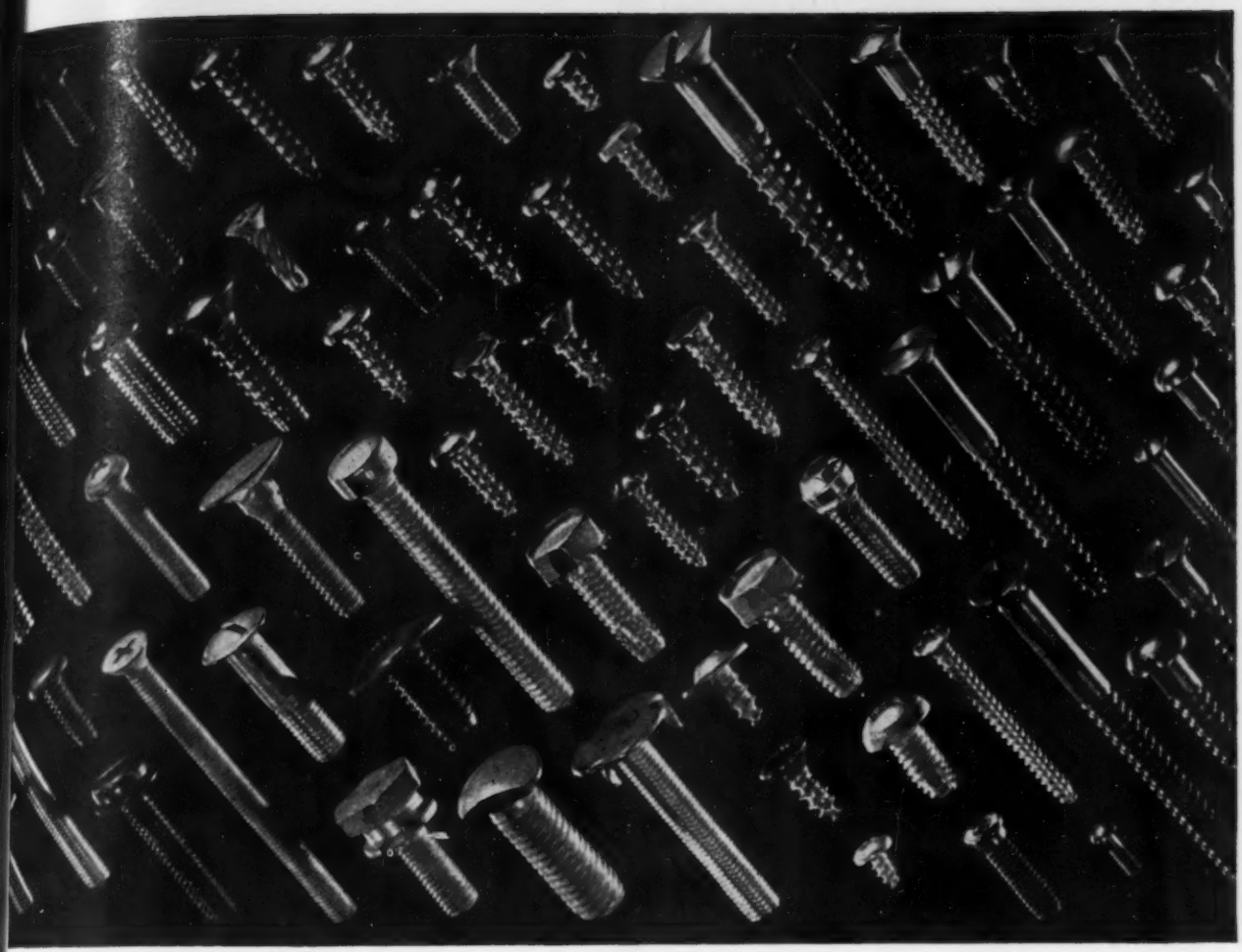
A WHITING LADLE TYPE FOR EVERY POURING JOB!
OVER 200 STYLES AND SIZES!



GEARED BOTTOM-TAP LADLES FOR SAFE, EASY POURING—Square bail, equipped with "5-Position" bottom tap rig or "Rack Type" rig. Ruggedly constructed of heavy steel plate, lapped and riveted seams, reinforced with steel bands placed above the trunnions and on the bottom of the bowl. Three supporting feet are also provided on ladle bottom. Capacities (steel) 8,925 to 48,975 lbs.

RIVETED CRANE LADLES—Taper side with V-bail. Seams riveted with flattened heads inside for easier lining. Steel reinforcing belt placed above trunnions which are formed by steel shafts, pressed and welded to large cast steel bases. Overlapping flanges protect journal boxes against spill. Capacities (Iron) from 805 to 8530 lbs.

Send for this complete catalog!



Each Made From the Right Cold-Heading Wire

If you're cold-heading fasteners, you know how important it is to start with the right wire. With the right wire, you can produce the fastener economically, and at the same time make an item that will do its job right.

Bethlehem can help you improve your production of cold-headed fasteners by supplying wire with the required properties. Perhaps the wire you need must have good machinability. Or perhaps it must be of the right composition to respond to heat-treatment properly. Or be able to withstand severe cold-heading operations.

And of course all fasteners call for wire that is sound, uniform in analysis, and free from injurious surface defects. But whatever your requirements—for fasteners, or any other application—you can be sure that we can supply you with the wire that will help make your product better.

Bethlehem makes just about every kind of steel wire. Some are general-purpose grades; others, like screw wires, are tailor-made for a single application. If you make screws, or any other item by cold-heading, give us a call. We'll be glad to recommend the right kind of wire for your job.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Bethlehem **COLD-HEADING WIRE**

BETHLEHEM STEEL

The Iron Age

Vol. 171, No. 23, June 4, 1953

* Starred items are digested at the right.

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Address mail to 100 E. 42 St., N. Y. 17, N. Y.

DIGEST of the

NEWS DEVELOPMENTS

INDUSTRY IS RECRUITING JUNE GRADUATES — P. 87
The class of '53 doesn't have many job worries. Industrial personnel people are now visiting college campuses to seek out and sign suitable young talent for many technical, sales and executive positions. Engineers are at a premium. Most grads already have jobs lined up—if they aren't being drafted.

STEEL LEADERS OPTIMISTIC ABOUT FUTURE — P. 88
Although mindful of serious problems ahead, steel industry leaders at the AISI meeting showed more confidence than they have for some time. All agree that they will have too much capacity and fear the possibility of severe price cutting later. Steelmen say 1953 will be a good year—barring a strike.

PORTLAND INDUSTRY GROWS ON PEACE BASIS—P. 92
Unlike other areas where defense contracts have contributed to manufacturing booms, the Portland metalworking industry is growing steadily on the basis of peacetime needs. Impact of defense contracts has been comparatively light. Yet Portland metalworking employs about 25 pct of the area's labor force.

CHRYSLER GOES HEAVY ON LIGHT METALS—P. 102
Widest use of aluminum and magnesium in the automobile industry is by Chrysler Corp. divisions. It's not just to make cars lighter, but because of a growing attitude that weight means cost. Many aluminum diecastings could be switched to magnesium with no change made in the dies.

CONGRESS CONSIDERING SDPA REPLACEMENT—P. 107
Smaller metalworking firms may soon find a brand new government outlet for loans. The House is weighing a replacement for the expiring Small Defense Plants Administration. Tentative title is Small Business Administration. Extent of financing, however, is now under fire by American Bankers Assn.

TWO-WAY APPROACH TO MORE PRODUCTIVITY—P. 113
Machine tool builders, metalworkers are striving to increase productivity by reducing parts handling operations and lowering cutting time. Strong consumer purchasing power depends on greater productivity. One company is conducting industry educational program on high speed turning for production men.

The Week in Metalworking

ENGINEERING & PRODUCTION

TAILORED SHOP MAKES HIGH-QUALITY GEARS—P. 141
Mass production of top quality automotive gears takes close liaison between design, heat treating and production departments. Fairfield Mfg. Co. had this in mind when it set up its new plant. It makes nearly 3000 different gears and related parts with more than 70 different steels and alloys.

WAYS TO BOOST ALUMINUM WELDING OUTPUT—P. 146
Three factors—a change in shielding gas, adaptation of a machine for two torch operation, and use of thoriated tungsten electrodes—tripled production of aluminum case boxes. Use of helium and direct current with the inert-gas-shielded tungsten arc process produced a hotter arc.

USES OF RARE EARTHS IN STAINLESS GROW—P. 148
The effect of misch metal is compared to use of rare-earth oxides. Oxides can be beneficial but different effects are obtained. They produce no significant residuals of cerium or lanthanum. Cerium fluoride ladle additions improve the surface and malleability of type 321 only.

TITANIUM CAN BE USED TO CONTROL SULFUR—P. 150
Titanium is three times more effective than manganese as a desulfurizer. Also, titanium can be used to prevent strain aging and grain coarsening. Practice is only good for killed steels. Average openhearth grades require 3.6 lb per ton of titanium compared to 7.8 lb of manganese for same effects.

INDUSTRY DEFINES IDEAS FOR YOUR PROFIT—P. 156
Here's a way to reduce over-the-table wrangling on the meaning of basic terms used in industry. Brought to you by THE IRON AGE as a special service, you can save time and money by applying these definitions to your management problems. Communications and understanding will be speeded by its use.

NEXT WEEK—CHEMICAL PLATING OF HARD NICKEL
Nickel plating by chemical reduction can now be controlled to produce hard, adherent deposits on a variety of metals. Process requires no electric current or anodes. Hence, no problems in throwing power. Intricate and irregular shapes are plated uniformly. Heat treatment improves the deposit.

MARKETS & PRICES

CONSUMERS VIEW BRIGHT NONFERROUS SCENE—P. 85
Outlook for the nonferrous metals supply is good with the single exception of nickel. Stockpiling will hold aluminum supply to present level. Aluminum may go up with wages. Copper price will probably drop. Tin responds to Far East situation. Zinc, lead and magnesium present no problems to buyers.

PURCHASING MEN SHIFT BUYING PERSPECTIVE—P. 91
In past years it was, "Hang the cost, get it." But industrial purchasing agents have now switched to a buy wisely and produce cheaply attitude. Nearly 2500 industrial buyers met in Los Angeles last week and picked up many ideas on how company profits can be boosted by improved purchasing policies.

CREDIT DEMAND HOT, INTEREST RATES UP — P. 96
Consumers, in addition to state and local governments, are borrowing more heavily than they were at this time last year. Result is that money, obeying the law of supply and demand, is costing more. But there's also more money in the consumers' pockets today. Interest rates soar on both sides of the Atlantic.

STEEL WAREHOUSE SALES RIDE BOOM CREST—P. 97
Sales by steel warehouses are running at a record breaking level, accounting for 18 pct of all steel sold. But in spite of the heavy sales volume, unprecedented shipments from steel mills are enabling warehousemen to build up their inventories. American Steel Warehouse Assn. spokesmen expect a decline later.

STEEL PEOPLE FACING NEW SET OF PROBLEMS—P. 199
Although steel people are proud of their expansion record, some freely predict that demand will soon fall short of taking all they can make. High fixed costs in their industry make this problem especially serious. Some steel officials fear price cutting might result. But consumers still seek more metal.

EXCHANGE RESUMES COPPER FUTURES TRADE—P. 202
Monday was the day. Trade in copper futures was resumed on the Commodity Exchange. The trade was watching closely. Alcoa and Kaiser have contracts for Canadian aluminum—780,000 tons of it. The metal will come from Kitimat and volume shipments from this source are at least a year away.

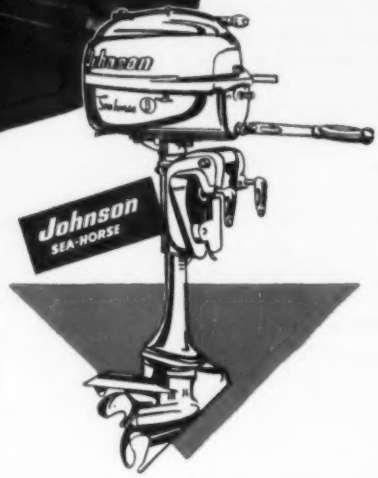
62 AJAX TAMA-WYATT Induction Furnaces—

Photo shows a part of the Aluminum Alloy Die Casting Shop at Johnson Motors.

help Johnson Motors produce millions of aluminum alloy die castings per year

Johnson Motors, Division of Out-Board & Marine Mfg. Co., Waukegan, Ill., has the largest aluminum die casting plant in the world using exclusively electric furnaces for melting and holding the metal to be processed in die casting machines for the production of outboard motors.

AJAX Induction Furnaces have proved most satisfactory for this concern because they have automatic temperature control, gentle movement of the metal (which prevents segregation), and amazingly low maintenance cost. Some furnaces have been operating for as long as 7 years without renewal of refractory lining.



"The best holding furnaces for aluminum die casting machines are considered to be electric induction furnaces. Where ingot is being added directly to the furnace for die casting, this is the only furnace on which there is little possibility of sludge formation at the bottom. The reason for that is obvious. The heat is where it belongs, down at the bottom of the furnace **in the metal.** Also, the agitation due to the internal electrical stirring, which has no effect on dross inclusions, gives the best conditions for holding furnaces (for either die casting or permanent molding), especially if it is desired to add pig directly to the furnace."

—From answer to "Quizmaster" question, provided by technical service staff of Federated Metals Div., American Smelting & Refining Co. in March, 1953, issue of American Foundryman.

Write for Further Information to

AJAX ENGINEERING CORP., TRENTON 7, N. J.

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

THE IRON AGE

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Controlled Circulation Audit

National Business Publications

A Youngster Speaks Out

THE older, the younger and the very young in the steel industry gathered themselves together last week in New York for their annual soul searching. They did a pretty good job of it too.

On the serious side the American steel industry takes second place to none. It is our keystone in national defense, a solid prop for our civilian economy and a strong support to the free world.

Its growing pains are about over. So, too, is its bellicose chestiness—so normal in youngsters. Maybe that is lamentable. It may become too respectable for the lusty lads who started the whole thing.

The wiser heads cautioned the younger ones and talked of tough problems ahead. In respectful silence the younger heads listened—privately thinking they will do things a little differently when they are in the driver's seat. But all of them had one thing in common—they love their industry.

That love sometimes causes a little touchiness where steel capacity and prices are concerned. To a steel man, over-capacity does not mean something bad. It means that things are not going at 100 percent. The way the term "over-capacity" is bandied about often causes some people on the outside to think steel is heading soon for a deep depression.

No one in steel really thinks that. Extra capacity is good insurance against world domination by the Communists. It is a permanent standby to insure a strong free world. For that we will willingly pay a premium.

One of the youngsters rose last week in solemn meeting and read the riot act to his older and younger confreres. Steel people are poor merchandisers, he said. Benjamin Fairless, U. S. Steel board chairman, shoved the needle in deep as he thought out loud. His formula could be called "maturity without despondency."

Here is the gist of what he said: Make each product pay its own way; base your price on facts not fiction; don't let anyone take your customers from you if you can help it; remain competitive without giving your product away; and look forward, not backward.

Tom Campbell

Editor

new BAKER gas-O-matic

. . . ELECTRIC TRUCK OPERATING ECONOMY
. . . . . GAS TRUCK INITIAL COST !

gas-O-matic has the smoothest acceleration and best "inching" characteristics of any fork truck, regardless of type of fuel or transmission. It is ideal for ramp work, for tiering, and for long or short haul operations. In fact it will perform almost any fork truck job better and cheaper.

gas-O-matic is a revolutionary new gasoline-powered fork truck with electric motor drive—designed from engine to drive wheels to incorporate the best features of both gas and electric trucks.

The secret of its outstanding performance and amazing operating economy is the new Baker GAS-O-MATIC transmission system. A specially designed variable voltage generator provides an incredibly smooth *unbroken* acceleration curve —directly controlled by the gas throttle.

ELIMINATION OF CLUTCH cures the biggest maintenance headache of gas-powered trucks.

ELIMINATION OF CLUTCH AND GEAR SHIFT prevents jerky starts and "step-ladder" acceleration.

ELIMINATION OF CONTROLLER AND RESISTANCE BANKS of electric and gas-electric trucks means fewer moving parts and results in less down time and lower maintenance costs.

gas-O-matic will do everything a comparable straight gas truck can do—do most of it better and more economically . . . plus some things that straight gas cannot do.

It will do almost everything a battery-powered fork truck can do—and some of it better . . . plus a few things that battery-power cannot do!

—Yet it costs little more* than a straight gas truck of the same capacity, and only about half as much as a battery-powered electric with charger and two batteries!

* **gas-O-matic** *model illustrated, 4,000 lb. capacity costs only* **$4895.00**

THE BAKER-RAULANG CO. 1853 100th ANNIVERSARY 1953 THE BAKER-RAULANG CO.

write for descriptive Bulletin No. 1344

THE BAKER-RAULANG COMPANY
1227 WEST 80th STREET • CLEVELAND 2, OHIO

The Baker-Lull Corporation, Subsidiary, Minneapolis, Minnesota
Material Handling and Construction Equipment

Baker ®
industrial trucks

Dear Editor:

Letters from readers

Mechanical Chemical Filter

Sir:

In the May 14 issue, p. 69, we note the development of a mechanical chemical filter used for water treatment.

Can you tell us who has developed and is manufacturing this filter?

D. C. WILLIAMS
Chief Metallurgist
Addressograph-Multigraph Corp.
Cleveland

Contact Salem Brosius, Inc., 248 Fourth Ave., Pittsburgh, Pa., for more details on the newly developed mechanical chemical filter.—Ed.

Metal Borides

Sir:

We refer to the Newsfront page of your May 21 issue and would appreciate if you could let us have more detailed information on the item referring to metal borides being used for pumps and nozzles handling molten magnesium and aluminum. We are interested in knowing who has pioneered this development.

I. TAMA
Ajax Engineering Corp.
Trenton, N. J.

Further information about metal borides may be obtained from American Electro Metals Corp., 312 Yonkers Ave., Yonkers, N. Y.—Ed.

Huge Capacity

Sir:

I noticed that in the May 14 issue there is an item about a giant cap screw machine being built for a Midwest plant.

We are interested as to who is building this machine and, if possible, would appreciate your advising us.

E. Y. BREADY
Director of Purchases
Standard Pressed Steel Co.
Jenkintown, Pa.

The National Machinery Co., Tiffin, Ohio, is constructing the cap screw machine.—Ed.

Supersonic Energy

Sir:

Some time ago there was an article in one of your editions covering the use of supersonic vibrations to relieve internal stress in castings.

We have had some experience in having cylinder castings having a tendency to expand in the unfinished gap that is used for other assemblies, such as plate clamps and blanket bars, the balance of the cylinder being the printing area. There seems to be a tendency for the cylinder to expand in this unfinished area, as we can regrind the cylinder taking off some high points nearest the unfinished gap and still keep the cylinder to its original grinding size.

Due to the very accuracy of our work, even on cylinders as large as 23 in. in diameter and 84 in. long and still hold to a grinding dimension using a maximum run-out of .001 in., this has become a problem.

I am outlining the above to give you a sketchy picture of what we had in mind for some usage of the article mentioned and I felt that if you had further information you might forward it to us.

R. P. TYLER
Installation & Service Mgr.
Harris-Seybold Co.
Cleveland

The trend in this relatively new field of vibrating molten metal is toward sonic rather than supersonic vibrations. Supersonic energy is quite expensive and it is believed that sonic frequencies will do the same job without mortal risk to the operator. We suggest you contact Davidlee Von Ludwig, 1565 E. 19th St., Brooklyn, N. Y., who has just been granted a patent on new methods of applying sonic energy to the type of problem which faces you.—Ed.

Graphitic Steels

Sir:

We have a report from one of our service engineers that there is a new steel with a trade name of "Graphos" which is reported to contain some graphite and be especially adapted for bushings and bearing work.

We have requested information on this from all of our usual sources of supply and can find no one who even heard of the name.

We would appreciate advice from you as to whether or not you have any information on the steel in question.

M. C. NESS
Asst. General Purchasing Agent
American Chain & Cable Co., Inc.
Bridgeport, Conn.

This steel is made by the Timken Roller Bearing Co., Canton, Ohio. A series of technical articles describing these steels were published in our issues of Feb. 28, 1952, p. 100 and Mar. 13, 1952, p. 106.—Ed.

Salt Bath Control

Sir:

Would you please send me three copies of the article "Control of Salt Baths," which appeared in your May 31, 1951, issue?

A. L. STOWE
Plant Metallurgist
Massachusetts Steel Treating Corp.
Worcester

for heat treating pipe

ihp*

SAVES MATERIALS

NEARLY 1,500,000 POUNDS OF MANGANESE AND MORE THAN 300,000 POUNDS OF MOLYBDENUM WERE SAVED

. . . in five years by this Selas pipe treating installation. No previous heat treating practice provided continuous quenching and drawing . . . no other production method fully developed the physical properties of plain carbon steel pipe . . . no other process permitted a substitution for the normalized, high alloy steel formerly used to meet specifications.

Two things made such a substitution possible . . . first, new concepts of heating and quenching; and second, new furnace designs which made such concepts workable and practical. Combined, Selas engineering and equipment for this and other Gradiation processes provide *Improved Heat Processing,* a symbol of Selas progress in furnishing heat for industrial purposes.

To the savings in materials, add those in time, working and storage space, handling, pickling, and product quality improvement, and you have a more complete story of what *Improved Heat Processing* can do for you. Write Selas when you need heat for such mill processes as:

HEATING STRIP, BILLETS, BARS, PIPES, SLABS OR WIRE
PRODUCTION FORGING OR HEAT TREATING
MELTING OR EXTRUDING

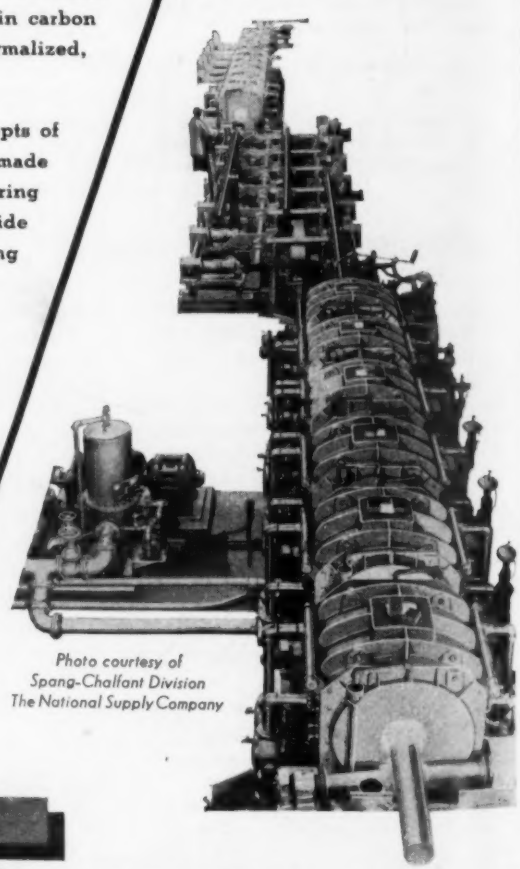


Photo courtesy of
Spang-Chalfant Division
The National Supply Company

***Improved Heat Processing**

SELAS

CORPORATION OF AMERICA
PHILADELPHIA 34, PENNSYLVANIA
Development • Design • Manufacture

Fatigue Cracks

by William M. Coffey

Any Objections?

What makes THE IRON AGE your one and only "ffj"—your favorite family journal? Its brilliant analysis of the weekly metalworking news? Its incomparable wealth of new technical ideas that has made all our readers millionaires? Because we're 98 years old? Of course not. It's because we're **human.** What other industrial or business magazine would print a picture like this—for no particular reason?

Don't know her telephone number, but Procter & Gamble sent it to us along with this commercial, "Casual hairdo's with no part, soft curls, are first choice for summer." P&G wants you to buy their new hair conditioner. And why not?

Raisin D'etre *(French)*

When you set up a shop like Fatigue Cracks—which is supposed to view the industry in a lighter vein— you get all kinds of strange things in the mail. Mostly, releases from public relations people like the one above from Procter & Gamble. We also get them from Atlantic City, from a big Television Network, from Allergy Research and New Developments and from Helena Rubinstein.

Helena's always telling us what to do with our nails, we knew 6 weeks in advance when the ocean would be unlocked at Atlantic City, and every week we get a preview from Channel 7 about What's going to happen to Captain Video, which makes us look pretty smart around the house. We only tell you this to prove what a glamorous business this is. But don't try to crack it. You have to be born with printer's ink in your veins.

More Definitions

Our pal Florine Bender carries on with her intriguing GLOSSARY OF RESEARCH TERMS:

"Metal parts are being made in the shop"—We are getting in a new draftsman to start on the drawings.

"This phase of the work will be accelerated" — Nothing else has worked; we might as well try this.

"This analysis agrees with experimental results" — We finally found the right fudge factor.

"The test was unsuccessful" — The setup was wrong (Instrumentation Section).

"The test was unsuccessful"— The instrumentation failed (Design Section).

New Puzzle

In an opening season baseball game between the Indians and the Tigers, the starting line-up of each team played the entire game and no substitutions were made. Play during the complete game is indicated by the following statistics:

1. Each Indian player stepped to the plate five times to take a turn at bat, while each Tiger player made six trips to the plate.
2. The Indians had a total of six men left on base, while the Tigers had a total of sixteen men left stranded.
3. Aggregated for both teams, there were six times as many *outs* charted as there were *runs* scored.
4. In the last half of the last inning, the losing team was retired in order.

Which team won the game? What was the final score? How many innings were played? Where was the game played?

Many thanks to R. W. Shank of International Harvester Company.

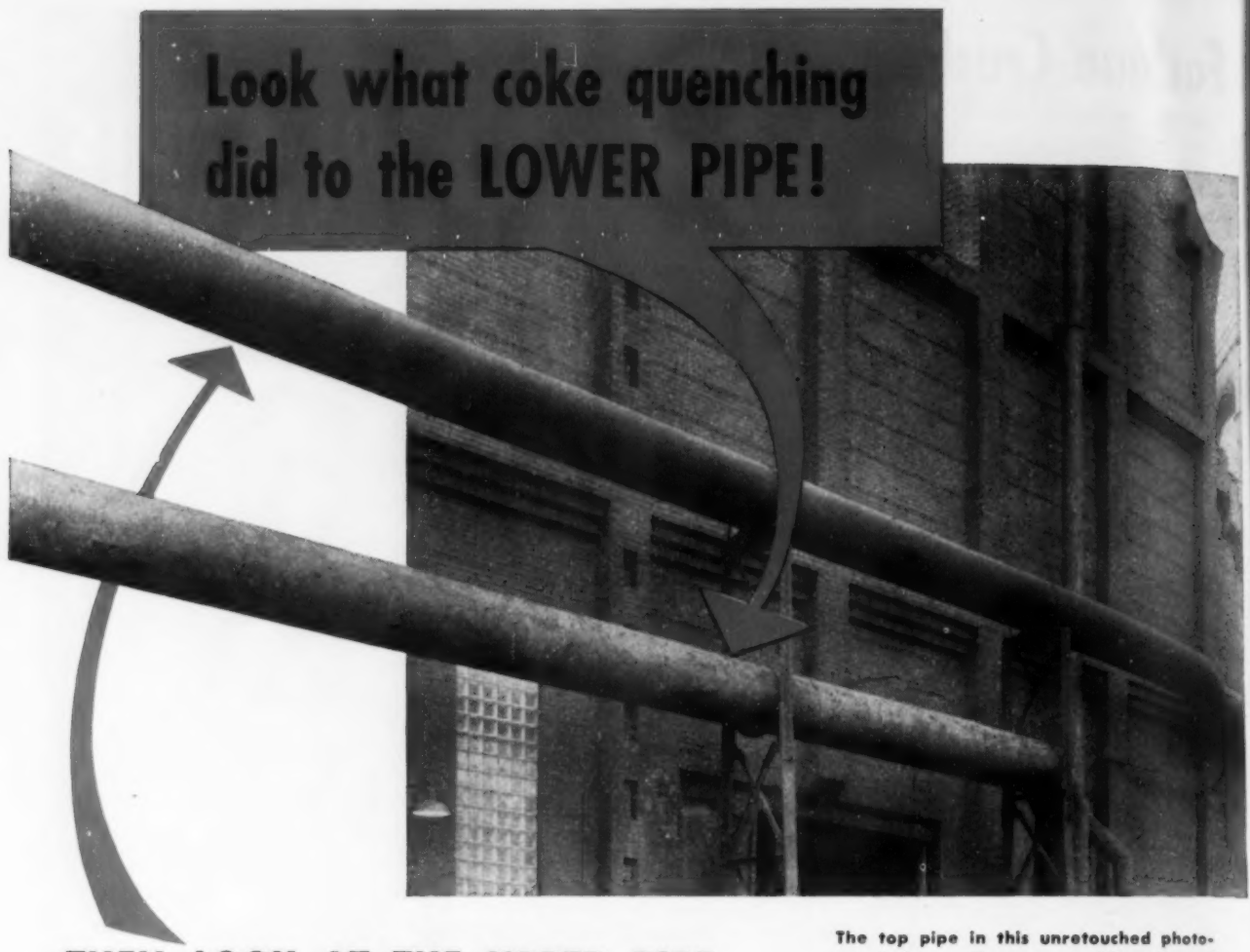
Puzzlers

Here's the correct solution to the "Town" puzzler:

	Lives	Works	Plays
Mr.	Bridgeport	Somerville	Reading
Mr.	Somerville	Paterson	Bridgeport
Mr.	Paterson	Reading	Middletown
Mr.	Middletown	Bridgeport	Somerville
Mr.	Reading	Middletown	Paterson

And here are some more winners: Sally Kurtz (Solution #2), Charles Heilman, James Talbot, W. C. Cook and C. Valentine, Josephine Ardovino and J. R. Eliason, Lt. USNR. (We're a little concerned about this one because Mr. Rice, who's never wrong, and several others sent us a different solution. We're checking.)

Look what coke quenching did to the LOWER PIPE!



THEN LOOK AT THE UPPER PIPE *completely protected* BY INSUL-MASTIC

The top pipe in this unretouched photograph has a three year old coating of INSUL-MASTIC, the *Superior* protective coating. The bottom pipe has been painted several times during those three years. These pipes are in a steel mill and both are constantly showered with acid vapors from a coke quenching tower which is around the corner of the building. So strong are the vapors that they sting the faces and arms of workmen, but three years of this punishment have not harmed the INSUL-MASTIC coated pipe.

Steel mills throughout the country are learning that INSUL-MASTIC lasts for years and years and practically eliminates maintenance and replacement of metal equipment. These coatings are extremely resistant to acids, alkalis and moisture. They are specially made that way. The generous use of Gilsonite, one of nature's most chemically resistant minerals, helps give this lasting protection.

Save your tanks, structural steel, pipes, quench cars and everything on or near your coke batteries. Do as other mills are doing. Specify INSUL-MASTIC for coating this equipment.

There is an INSUL-MASTIC representative near you. ★ ★ ★ Write for his name!

Think First of the Coatings that last!

Insul-Mastic

CORPORATION OF AMERICA

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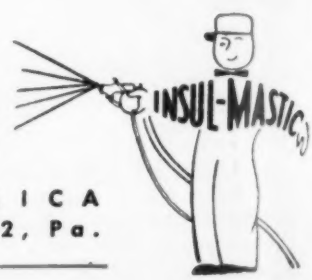


Dates to Remember

Meetings

JUNE

SOCIETY OF AUTOMOTIVE ENGINEERS, INC.—Summer meeting, June 7-12, Ambassador & Ritz-Carlton Hotels, Atlantic City, N. J. Society headquarters are at 29 W. 39th St., New York.

MACHINERY DEALERS' NATIONAL ASSN.—Annual convention, June 9-11, Cleveland Hotel, Cleveland. Association headquarters are at 1346 Connecticut Ave., N. W., Washington.

AMERICAN ELECTROPLATERS' SOCIETY—Annual convention, June 15-18, Benjamin Franklin Hotel, Philadelphia. Society headquarters are at 445 Broad St., Newark, N. J.

EXPOSITIONS

NATIONAL METAL SHOW—Oct. 19-23, Cleveland.

BASIC MATERIALS CONFERENCE—Annual exposition, June 15-19, Grand Central Palace, New York. Management—Clapp & Poliak, Inc., 341 Madison Ave., New York.

AMERICAN WELDING SOCIETY—National spring meeting, and welding and allied industry exposition, June 16-19., Shamrock Hotel, Houston. Society headquarters are at 33 W. 39th St., New York.

AMERICAN MANAGEMENT ASSN.—General Management Conference, June 17-19, Statler Hotel, New York. Association headquarters are at 330 W. 42nd St., New York.

ALLOY CASTING INSTITUTE—Annual meeting, June 28-30, The Homestead, Hot Springs, Va. Institute headquarters are at 32 Third Ave., Mineola, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS — Semiannual meeting, June 28-July 2, Statler Hotel, Los Angeles. Society headquarters are at 29 W. 39th St., New York.

AMERICAN SOCIETY FOR TESTING MATERIALS — Annual meeting, June 29-July 3, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J. Society headquarters are at 1916 Race St., Philadelphia.

JULY

TRUCK TRAILER MANUFACTURERS ASSN.—Annual summer meeting, July 23-24, Edgewater Beach Hotel, Chicago. Association headquarters are at 1024 National Press Bldg., Washington.

NATIONAL TOOL & DIE MANUFACTURERS ASSN. — Summer meeting, July 30-Aug. 1, Milwaukee. Association headquarters are at 907 Public Square Bldg., Cleveland.

AUGUST

WESTERN ELECTRONIC SHOW & CONVENTION—Aug. 19-21, Civic Auditorium, San Francisco. Headquarters are at 1355 Market St., San Francisco.

Announcing

THE **NEW**

VAN NORMAN

DIVERSIMATIC*

CENTERLESS GRINDING MACHINE

. . . another addition

The new Van Norman *Diversimatic* centerless grinding machine incorporates many outstanding, exclusive advantages that result in more work output per operator, per work shift.

This rugged, precision-built, heavy-duty centerless grinder enables you to perform three centerless grinding jobs with practically no change-over time. It's a standard centerless grinder for ordinary throughfeed work . . . a standard grinder for infeed jobs . . . and equipped with a Crush Forming attachment, it form grinds and does profile work.

COMPARE THESE OUTSTANDING VAN NORMAN DIVERSIMATIC FEATURES

- Special, easily removable grinding wheel spindle quill, with combined double-row super precision ball and roller bearings, sealed and lubricated for life assure trouble-free operation
- Spindle requires no warm-up period
- Combination straight and contour grinding wheel dresser.
- Straight screw-type regulating wheel dresser
- Grinding wheel diamond constantly flushed from below with coolant during wheel dressing
- Infinitely variable ¼ h.p. regulating wheel drive, 30 to 300 r.p.m.
- Large 1⅞ inch 4 thd. Acme Infeed Screw with full length split type nut to compensate for wear
- Work-Rest adjustable for position; may be fixed across the ways or made to feed in and out with the regulating wheel

Get the full facts on the Van Norman Diversimatic Centerless Grinder. See for yourself how this versatile grinder can cut your grinding costs on small shafts, formed shapes, parts of two or more diameters or special contours.

*Van Norman Diversimatic acquired from Diversified Metal Products Co.

The Iron Age
FOUNDED 1855

THE IRON AGE Newsfront

CONSTRUCTION PLANS FOR THE BIGGEST ORE FREIGHTER ever built in a Great Lakes port have been announced by National Steel Corp. The new 23,000-ton vessel will measure 710 ft in length, have a 75-ft beam. The ship will be ready in 1954.

ONE INDEPENDENT AUTO PRODUCER RELAXED when a strike cut shipments of automotive gears. Chance for a production slowdown was welcome because the producer was having trouble moving finished stocks. Pileup of used cars at the distributor level has a second independent worried.

INCENTIVES CONTINUE AS A SOURCE OF FRICTION between management and labor in the steel industry. Some companies have been plagued with slowdowns and strikes over this issue but for the most part disputes are being resolved over the bargaining table.

AIR FORCE RECIPROCATING ENGINE PRODUCTION IS MOVING SLOWLY without further defense budget cuts. One producer of component parts is on a part-time basis. A producer of engines, on one shift and without using full facilities, is working a month ahead of schedule.

THREE-PHASE WELDING IN PLACE OF RIVETING is being used by a maker of auto wheels to join disks to the rim. The welded wheel stands up under more pressure. Operation can cut floor space by a third.

DIE CASTING PRODUCERS HAVE REPORTED 50 to 60 zinc die releases with a single treatment of a new release agent. Some die lubricants previously used gave only two or three releases. In shell molding it may eliminate the use of solvents. In many cases it reduces resinous buildup on pattern plates.

AUTOMATION IS NOT WORRYING builders of lift trucks. Despite rise of automatic handling, lift truck sales have been increasing. One reason is that smaller shops are taking a larger share of truck output and builders feel this market still has tremendous potential.

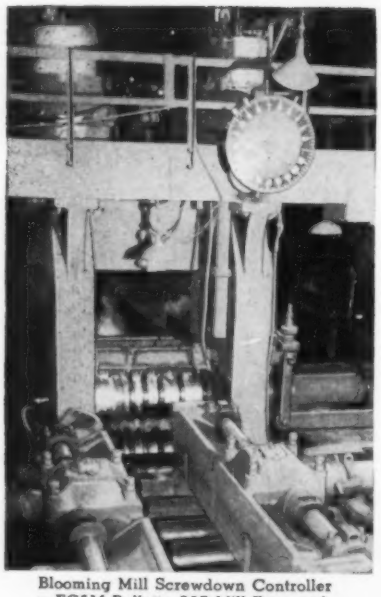
PRODUCTION OF PRESSED POWDER METAL PARTS is said to have been stepped up by 400 pct in a newly designed powder metal parts press. Improved handling of materials is a big factor in the higher production attained.

LIGHTWEIGHT, LONG-WEARING HELICOPTER ROTOR BLADES with a high ratio of lift capacity to weight will result from studies in propulsion, flying and handling qualities, load and stress problems. Engineers are seeking larger, more powerful craft with long service life.

PROTECTING SMALL BUSINESS from pseudo-small business is an objective of top Defense Dept. officials. Fact is, so many regulations surround government awards that procurement officers must often give contracts to a shop incapable of doing the job. Meanwhile, a nearby plant—which made similar parts in World War II—may wind up making the part on a subcontract basis.

Control room in large steel plant showing EC&M TAB-WELD Resistors used with mill controllers.

...and not one cent for maintenance



Blooming Mill Screwdown Controller —EC&M Bulletin 925 Mill Type with LINE ARC Controllers and TIME CURRENT Relays—famous for low upkeep, too.

Throughout this large steel mill, thousands of EC&M TAB-WELD Resistors have been giving trouble-free service on hard-worked, heavy duty applications. Not one cent has been spent for maintenance — NO BURNING.

When an accident smashed the end-frames and spacers of two sections, there was NO LOSS in production. Even under the damaged condition, the circuit remained intact due to TAB-WELD'S all-welded construction.

Also important are—the many taps which make on-the-job connections or adjustments easy. And, too, these resistors are corrosion-resistant.

For topmost performance specify EC&M Bulletin 942 TAB-WELD Resistors.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

NONFERROUS: Supplies Good, Prices Stable

Production, stocks of major metals high, with outlook good . . . Nickel improving but still tight . . . Prices fairly steady, with only mild fluctuations expected—By R. L. Hatschek.

With the shortages behind them, consumers of major nonferrous metals today look forward to a comfortable year of fairly plentiful supply and generally stable prices. Those past shortages have served to lever up production to present high rates and only a few complicating factors are apparent which could disturb the market.

More than 100,000 tons of aluminum are being produced a month—and the rate keeps climbing as new facilities are activated. Last year only 78,000 tons were being produced in an average month. One complication in the aluminum market is recent resumption of government stockpiling.

Keep Stockpiling Aluminum

Federal mobilization officials maintain that stockpiling must continue. Yet, civilian consumers have been assured they will get about the same quantities in the third quarter as they are now receiving.

Although aluminum prices now seem stable, increases in wage costs could force a price rise despite producers' desire to build up their civilian market by keeping prices attractively low.

Traditionally the United Steel Workers ask for the same sort of wage settlement from the aluminum industry as they win from the steel mills. Thus aluminum makers are sitting in spirit at the steel-union bargaining table this week. If a wage boost is passed along to the aluminum industry, a compensating hike in prices may very likely be an early result.

Copper Output Climbs

The copper picture is also promising. Production is running at high levels and is increasing. But it would be impossible to raise output rates as much as in aluminum. Supplies are at least adequate and prices are more likely to descend than rise.

Removing price controls brought forth a flood of copper scrap, putting refiners and ingot makers in a sound supply position. Scrap dealers literally emptied their yards when prices hit the top. Buying prices were cut but supplies were exhausted. Now the scrap price is climbing again in an attempt to refill empty pipelines.

It now seems refined copper prices will dip a bit this summer, though they probably will not descend to old ceiling levels. Feeling in copper trade circles is that Chile will not be able to demand the current high price very much longer.

Lead, Zinc Abundant

From a consumer's viewpoint, lead and zinc also look optimistic. Production of both, while high, is being slowed by present low price levels but the outlook for supplies is excellent.

Zinc prices won't be able to gather strength until huge stocks, resulting from steel strike inactivity last year, can be worked off. Also imports are arriving in good quantities and since the U. S. price is tied to the world market domestic prices are held down. The proposed sliding scale tariffs, if enacted into law, would stiffen prices

Supply, Demand and Price Outlook for the Major Nonferrous Metals

	ALUMINUM	COPPER	LEAD	ZINC	TIN	MAGNESIUM	NICKEL
PRODUCTION	High, getting higher.	High. Improving, but not so fast as aluminum.	High. Being cut by mine shutdowns.	High. Being cut by mine shutdowns.	High.	High. Being cut.	Good. Improving, but not sufficient.
AVAILABILITY	Continuing the same as a result of stockpiling.	Improving steadily.	Fairly easy. Demand up now seasonally.	Smelter stocks very high. Imports good.	More than adequate.	Plenty.	Tight. Will stay tight.
PRICE OUTLOOK	Steady. Depends on wages.	Slight decline. Chilean price cut likely.	Mild fluctuation.	Steady.	Fluctuating slightly. Sensitive to Far East.	Stable.	Official price steady. Scrap, "gray" market high.

ATOMS: Let Industry In, Says AEC

Agency proposes law changes to end atomic monopoly . . . Believe power plant would be economical if plutonium were sold . . . Firm announces pilot generator design.

The atomic energy monopoly may be one step nearer its end as a result of a major policy statement of Atomic Energy Commission. The agency feels that now is the time to open the field to private industry.

Proposals for changing the present law were handed to Congress last week. If the AEC suggestions are followed, private firms will be allowed to own reactors under license. They'd be allowed to produce and own fissionable materials. And permission would be granted to "use and transfer fissionable and by-product materials not purchased by the commission."

Feeling of AEC is that fission-generated electricity can be made competitive with generally used energy sources within "the foreseeable future."

Must Sell By-Product

But an economic nuclear reactor for commercial power production alone is years away. An AEC report released this week indicates, however, that a reactor to produce commercial power is feasible if its plutonium production is sold to the government for use in A-bombs.

Four industry groups have spent about $1 million studying the possibilities of industry participation in the joint production of electricity and fissionable material. Each had a different suggestion as to the reactor type holding the most promise. The groups did not have access to each other's ideas and first choices are now reported to be changing.

Value of their reports lies not so much in the details of proposed designs as in the coordination of reactors with various arrangements for producing power.

All plans involve the use of conventional steam turbines supplied with steam from boilers which in turn are supplied with heat from the coolant flowing through the nuclear reactors. Only one involves steam at pressure higher than 500 psi or temperature above 750° F.

Attacking the problem from a different angle, North American Aviation, Inc., last week announced a design for a generating plant which would not produce plutonium. It's not claimed to be economic at present—but the firm feels that such a plant would make more sense to utility companies.

2-Year Construction

The design, which would cost about $10 million to build, is for an 8000-kw pilot plant to supply operating knowledge and engineering data. Construction would take about 2 years.

With the knowledge gained, North American believes a 150,000 to 250,000-kw plant could be built for some $300 per kw compared to about $200 per kw for a coal plant.

Fuel would be uranium. Operating temperature would be about 1000°F and the heat transfer medium would be a molten metal such as sodium.

The firm also said it stopped work on atomic engines for aircraft because of the shielding problem. Six feet of concrete, or its equivalent in lead, would be needed to protect the crew.

Special Report

Continued

considerably. Enactment, however, seems unlikely. The same situation would prevail for lead on variable tariffs.

Seasonal demand for lead is keeping prices firm and there have been several small jumps in recent weeks. Outlook is for prices to hold very near the current figure.

Korea Sets Tin Price

Tin production is still outstripping consumption and this is seen as continuing. Yet, political and military developments in the Far East will still have a far-reaching influence on the overall tin situation. Prices are unpredictable, fluctuating with each turn of the truce negotiations at Panmunjom. The more promising the outlook for peace, the lower the tin price slides.

While output of magnesium is now being severely cut back as five of the six government-owned plants are being shut down, production will still surpass total demand. The stockpile is sizable—but if the market tightens plants can be reactivated quickly.

Nickel remains the sharpest thorn to metal consumers. Though increasing, supplies are just not adequate for both civilian and military uses in this era of high-temperature applications. It does not now seem that the official price will be boosted but scrap nickel is commanding a price well above primary metal. "Deals" are reported in which nickel moves at as high as $2 per lb.

GRADS: Industry Wants Joe College

Personnel men visit the campus to fill waiting jobs in tech, sales, executive departments . . . Will graduate up to 23,000 engineers . . . What draft does to prospects—By G. G. Carr.

Industrial personnel men are now making trips to the college campus to recruit suitable young talent for many technical, sales, and executive positions waiting to be filled.

If your son is graduating from college this month, you won't have to worry too much about his finding a job. If the Army doesn't grab him, chances are he has one lined up already.

Most sought after, as usual, is the engineering graduate—and almost any degree will do.

Draft Takes Toll

It's well-known that industry and the nation are faced with a serious shortage of trained men in several categories. The military draft just makes it that much worse.

Somewhat under 300,000 students will receive the bachelor degree or its equivalent this June. About 75 pct will be eligible for the draft. A good percentage will be lost to industry for another 2 years. Between 21,000 and 23,000 graduates will be engineers. From 25 to 30 pct will be called to the colors this summer, and another 10 to 20 pct will go into post-graduate work before or after military service.

Industry, with 40,000 engineering jobs to fill, is offering as high as $350 to $450 per month for a B.S., and up to $450 for an M.S. Samuel Beach, director of placement at Columbia University, told THE IRON AGE, "It's so bad that our engineering students are interviewing prospective employers, rather than the other way 'round."

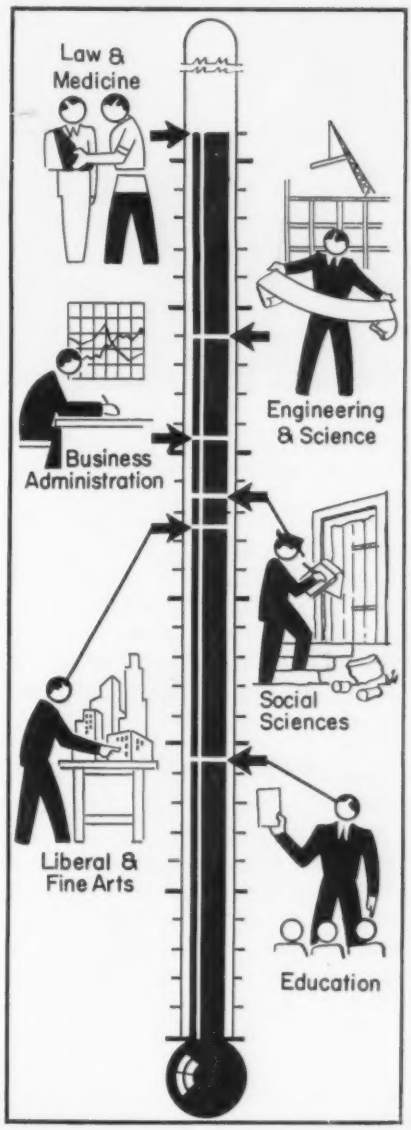
Added Portion of Training

Northwestern University reports an increasing number of employers are offering on-the-job education, paying tuition for night school. New York University notes that some firms are even sending trainees back to school on a full time basis. This practice is by no means widespread, but is on the increase.

Engineering and science students are most sought by industry, but other undergraduates get their share of attention. The business administration field looks especially lucrative at present. Biggest shortages are in accounting and sales, with good openings in almost all phases of business and industrial administration generally.

Banking has not been known for high starting salaries. But competition for competent personnel has forced bankers into the graduate manhunt too. Placement directors report very attractive openings in banking, are recommending it as a career to young graduates.

Who Earns Most



How Others Fare

Humanities and social science students generally fare almost as well as business administration majors. Starting salaries for non-technical graduates run about $350 $400 for the M.A. And an increasing number of employers prefer a general to a specialized education.

But the boys who choose the "creative" jobs are liable to find it tough sledding. Publishing, advertising and the like are over-applied for, with competition for jobs keen. Starting salaries are generally low, and job turnover high.

Poets, painters and musicians have their own specialized problems, rarely enter the general business field. But job openings seem to be improving in the arts and related activities.

Employers Consider Draft

Fly in the ointment for all graduates is the draft. Many escape it, but most are resigned to it. Employers tend to shy away from draft-eligible men, with the exception of engineers, who can go in many cases straight to the drafting board or other technical duties in industry.

Probably the biggest problem posed by the draft is the way it limits choice in selecting jobs. Generally the graduate is limited to larger firms, who hire in batches every spring, plan on fairly high rates of attrition among young employees.

Smaller firms are usually more selective in hiring, do it on an intermittent basis. Their manpower needs are limited, and they just can't afford in most cases to lose an employee for 2 years after 6 months of training.

STEEL: Leaders See Hopeful Future

Officials at AISI meeting much more optimistic than last year when under gloom of seizure . . . Some fear price cuts result of greatly expanded capacity—By W. V. Packard.

Steel leaders, though mindful of serious problems ahead, sound more optimistic about the future of their industry than they have for some time. Confidence was a strong theme at the 61st general meeting of American Iron and Steel Institute at New York last week.

Though it's true they generally believe production capacity will soon exceed demand (fourth quarter of this year is most frequently mentioned as the time), they do not view this as the end of the line. They seem more gratified that there is still a little time to get their house in order before they meet the problem head on.

Benjamin Fairless, chairman of U. S. Steel Corp., said what many were thinking when he flatly declared: "There isn't any question about it—we are going to find ourselves with too much capacity in this country in a very short time. What are we going to do about it? Are we going to brag that we lost less money than a competitor?"

Balance Out Prices

Without trying to speak for other producers, or "tell them how to run their business," Mr. Fairless said it was no secret what course his company would follow. "I'm going to announce the price of every product we make. I'm going to bring about the proper price relationship on every product (and) this same price will be available to every customer."

Mr. Fairless said steel prices should change on the basis of individual company decisions, that they should go up and down as cost and other conditions change.

He served notice on any would-be price cutters that his company will remain competitive.

Other steel leaders expressed enthusiastic agreement with Mr. Fairless' stand. Concern over the industry's growing capacity does not mean that steel people regard it as a financial millstone. Their greatest concern is that it might result in severe price cutting—even worse than that which plagued the industry during the 1930's.

In these boom times there is broad concern in the industry over its slim profit margins. Feeling is that even a moderate decline from record volume will hurt because fixed overhead would raise unit costs above income. Concern over narrow profit margin is reflected in official statements that steel prices are too low. It is one of the big reasons a wave of extra increases has just gone through the industry.

Expect Good Year

Nevertheless, steel people are generally confident that if they can sidestep a strike 1953 will be a good year. Terrific production and sales volume should make that a safe bet, though high taxes and narrow margin will likely hold profits in check.

Air of optimism at this year's meeting was in radical contrast with the setting a year ago when industry leaders met under the gloom of Federal seizure. Many believe the industry passed a crisis when the Presidential seizure was ruled unconstitutional by the Supreme Court.

There is no question that the industry sheds its whipping boy role with great relief. Perhaps this is the greatest single factor causing industry leaders to believe that the future will be better than the immediate past.

Sees Steelmaking Marvels

T. M. Girdler, chairman of Republic Steel Corp. predicted the improvements of the past 50 years will prove only introductions to the marvels just ahead.

"Dream if you will about possibilities of chemistry, electronics, atomic power . . . . We shall also adapt the skills we have gained in making steels to working with rare metals like titanium, zirconium and germanium. I think there should be no limits to where we can go or what we can do."

Rose Above Obstacles

Mr. Girdler recalled how politicians of the thirties and forties had "made a Roman holiday to discredit business." Regarding that period he said the best thing he could recall was industry's ability to increase output steadily, despite such difficulties.

Dr. John Chipman turned the

LEADERS of U. S. and Canadian steel companies compare notes. Left to right are Benjamin F. Fairless, chairman U. S. Steel Corp.; T. M. Girdler, chairman Republic Steel Corp.; and H. G. Hilton, president of The Steel Co. of Canada.

spotlight on steel's course of the future in delivering the Annual Schwab Memorial Lecture. "Elements unheard of or ignored in steelmaking a few years ago are now playing an important part in production of better steel products," he said. "It seems inevitable that soon steel researchers will find important uses for still more of the 92 natural elements in the world, some of which are not even considered in present steelmaking practice."

Outlines Technical Advances

Dr. Chipman pointed out that steel technology has progressed so far that minor steelmaking elements—such as sulfur, phosphorus, nitrogen, and others—are now at the heart of nearly every problem in steelmaking chemistry.

Max D. Howell, executive director of AISI, applauded the industry on postwar expansion achievements, matched nowhere in the U. S. or the world. Over $5 billion dollars of private capital has been spent to raise capacity by more than 26 million tons in the short span of 7 years.

"In light of President Eisenhower's recent address, in which he warned that freedom still is in danger, the steel industry has rendered a great service by voluntarily increasing its capacity so rapidly and so extensively. Ample steel producing capacity is the nation's right arm. . . . There seems no doubt that demand for steel for defense purposes will continue for some time, but this will involve no great problem."

"Stern World Competition"

Michael J. Layton, head of International Relations Dept. of British Iron and Steel Federation, pointed out that the world market for steel is now moving toward sterner competition.

Production of steel in Western Europe, which reached a rate of over 71 million tons a year in the first quarter of this year, appears to be overhauling demand, he said.

"In the U. S. new plants should soon make it possible to meet home demand and re-enter the export market in a more substantial way. In Europe the same conditions are occurring."

WINNERS of AISI regional technical meeting award for paper on "Heating-Up Openhearth Furnaces After Rebuilding" are H. M. Kramer and C. M. Jewart of Bethlehem Steel. Presentation is by Executive Director and Treasurer of AISI, Max D. Howell, who was elected Executive Vice-President.

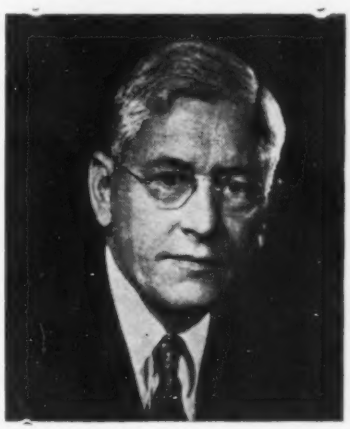
Rapidly spreading practice of using oxygen in bessemer steelmaking may result in evolution of a new, major steelmaking process, according to William C. Bell, joint director, research and technical development, Stewarts and Lloyds, Ltd., England.

Use of thinner blast furnace linings of carbon refractories to get more iron production from furnaces was described in a paper presented by J. M. Stapleton and W. S. Debenham of U. S. Steel Corp.

W. A. Black of Republic Steel Corp. told how ultrasonic testing could contribute to preventive maintenance by early detection of flaws otherwise not apparent in heavy metal parts.

How rare earth elements, such as cerium and lanthanum, do valuable work in improving rolling and forging properties of certain stainless steels was described by C. B. Post and H. O. Beaver of Carpenter Steel Co.

H. G. Hilton, president, Steel Co. of Canada, said the population of Canada is still far too small in relation to the industry it has created. "We need every Canadian we can produce and many more people besides." Mr. Hilton said young Americans should be encouraged to move to Canada.



PROGRESS in steelmaking was highlighted by Dr. John Chipman, head Dept. of Metallurgy, MIT.

INSTITUTE MEDAL was presented to J. H. Kelley, Bethlehem, for paper "Developing Use of Coke Oven Gas in Openhearth."

Electronics:

Nationwide network of servic ing organizations is planned.

National Industrial Electronic Service Affiliates hasn't been in business long enough to prove itself, but the idea behind the organization indicates a possible way of easing electronic repair problems.

If the plan is successful, the results would be: A low-cost national electronic servicing organization for manufacturers of electronic equipment; better, less expensive servicing for industrial plants; more business for repair shops.

Basically the NIESA program is designed to improve electronic repair service in small and medium size industrial plants which do not have electronics engineers and to eliminate service problems for manufacturers who do not have their own repair network.

Need Skilled Shops

Idea is to select highly skilled electronic service firms located near all the major industrial centers in the country. These firms would receive intensive training in the specific electronic devices produced by manufacturers taking part in the program.

Cost to the electronics manufacturer interested in obtaining a national network of service firms specializing in his equipment is low. The only charge is for a sound-slide training film that is used to instruct repair firms in servicing the manufacturer's equipment. This averages $125 per hr of film.

For the repair shop that wants to join NIESA, the cost is $125 for registration and 10 pct of all income from NIESA servicing jobs.

At present, NIESA has 28 carefully screened repair firms in its organization. Manufacturers of electronic equipment were approached for the first time last December and so far three have firmed. NIESA headquarters in Brooklyn expects to be providing repair service for 19 manufacturers by end of 1953.

MATERIALS: Wise Buying Means Profits

Purchasing attitude has changed from "get it at any price" to buy wisely and increase company profits . . . Steel supply remains prime concern . . . June banner month—*T. M. Rohan.*

The men who in past years had to get industrial raw materials no matter what the price have shifted their purchasing perspective to a buy wisely and produce cheaply attitude. They were in Los Angeles last week, almost 2500 of them, gathering new ammunition in ideas to increase company profits by wise purchasing.

Members of the National Assn. of Purchasing Agents heard retiring president of the group H. W. Christensen, U. S. Steel's Columbia-Geneva Div. He told them that for 15 years purchasing agents have been told to "get it at any price—but get it." Now the PA must show management he can also save money. He must operate at the top level of business management, with topnotch personnel to meet market conditions.

Record June Month

For PAs more worried about today's bird in the hand, the picture was generally encouraging. Business Survey Chairman R. C. Swanton said June will be a banner production month because of preparations for July vacation shutdowns. Most buying now is in the 30 to 60 day bracket. (See THE IRON AGE, May 28, 1953, p. 76).

That steel supply was a prime concern was reflected in a packed special session. While speakers stressed better supplies, however, the question period showed members more interested in price.

The sore spot of fob shipments was brought up by L. S. Hamaker, Republic assistant general sales manager who said he believed some freight absorption will have to come. Although mills prefer fob to save out of pocket expense, they have to meet local competition. Home markets like Pittsburgh are unable to absorb all output, so 40 pct is shipped out.

RETIRING NAPA president H. W. Christensen, of U. S. Steel, (right) shakes hand of newly elected president E. F. Andrews, of Pitman-Moore Co.

But since $1 freight won't go as far as it used to, a general constriction of market is probable.

The Cleveland mill of Republic, for example, has turned down 5-year contracts from Chicago because it will not be economically feasible for customers when their demand drops off.

"Adequate Price Rise"

The question of when a new steel price increase is coming was handled by Kaiser's R. L. Asquith with "a wage increase is historically followed by a price increase" to which Columbia-Geneva's Marcus Aurelius added "which is usually inadequate."

Hamaker answered another question on "When are we going to have firm pricing for future delivery?" with "When buyers stop giving us orders with P.I.E. clauses."

A more promising picture of the PAs in the nonferrous field was outlined by members of a special N.A.P.A. committee. Alcoa's T. O. English, assistant general purchasing agent, said aluminum supply and demand will level in 1954 for the first time in 15 years.

Third and fourth quarter '53 supply will continue spotty and tight, mostly due to government stockpiling. Production for 1953 is expected to hit 1.25 million tons and reach 1.75 milllion tons when current expansion is completed.

Copper price declines to under 30¢ lb were seen by Charles L. Mee, Commonwealth Edison of Chicago purchasing agent. He said 1954's projected increase of 50,000 tons and 127,000 tons additional capacity to be started then, plus more imports and displacement by aluminum ACSR for conductors will keep prices down and help deliveries. Earl L. Goodwin, Westinghouse assistant general purchasing agent, advised keeping copper inventories down to cash in on price drops.

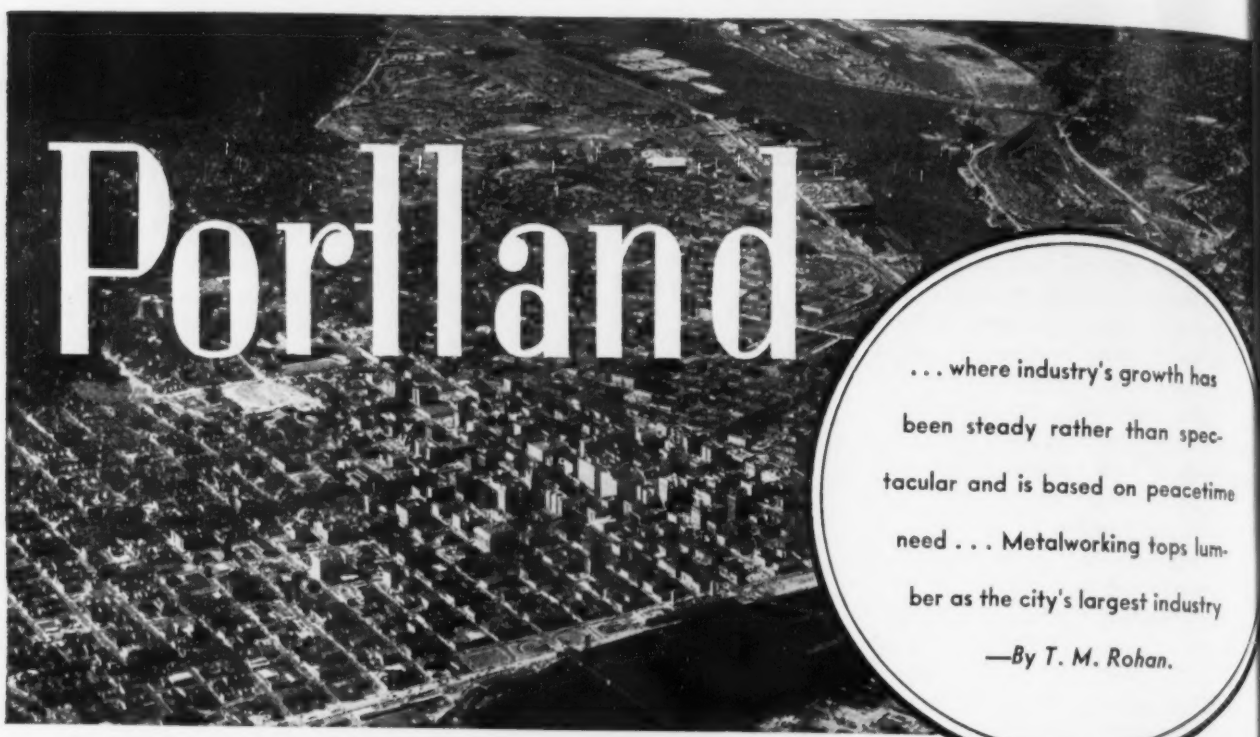
Stabilize Tin Prices

Considerable work is in progress to stabilize tin prices, R. C. Moffit, U. S. Steel purchasing director, reported. He said a proposed international agreement will be drafted in Brussels June 15 for possible presentation to the U. N.

Prices and supply will probably stay at present levels due to decline in heavy tin-consuming hot dip tinplating process, increase in conventional electrolytic tinplate output and differential coating.

Nickel supplies will remain tight for some time but cadmium has no price or supply problems, Harold A. Berry, Ingersoll Products procurement manager, said. Japanese nickel is selling at four times the domestic price or about $2 lb on the black market now. The third quarter picture will be unchanged supply-wise but the fourth will show a slight improvement. Canadian and Cuban mine production is going up and the recent Moa Bay, Cuba, deposit discovery by Freeport Sulphur will add 30 million tons production by 1955.

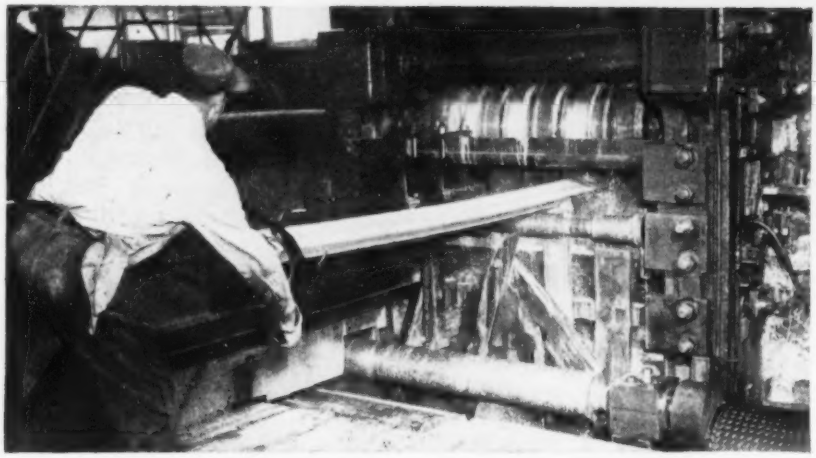
Low lead and zinc prices are shutting down mines with up to 5000 tons annual capacity lost, J. J. Sharkey, Olin Industries purchasing head, reported.



Portland

. . . where industry's growth has been steady rather than spectacular and is based on peacetime need . . . Metalworking tops lumber as the city's largest industry

—By T. M. Rohan.



ACROSS THE RIVER in Alcoa's Vancouver, Wash., plant, an aluminum ingot starts on its way to becoming aluminum rod and wire. Below, a tractor is used to skid logs.

Unlike Boeing-dominated Seattle in the north and war-booming Los Angeles in the south, the metalworking industry in Portland, Ore., has not mushroomed in overnight boomtown tradition. Development has been steady rather than spectacular and is based on solid peacetime need.

Impact of defense work on Portland has been relatively soft. Gunderson Bros. has the largest defense contract, a $6.5 million Navy order for 40 barges and 190 LCM-6 landing craft. Screw Machine Products is next in line with orders for $6 million worth of components for 20 mm shells and fuzes.

Metalworking Dominates

In spite of limited defense work, and without benefit of special tax, property or building concessions, the metalworking industry is the leader in the four-county Portland area, employing 15,000 workers, or about 25 pct of the total manufacturing employment.

The lumber industry is runner-up with 10,000 area employees on its payrolls.

Portland also seems to have a

favorable climate for small firms which every now and then are able to edge out larger companies. Recently Beall Pipe & Tank Corp. underbid Consolidated Western and Bethlehem at $3.2 million to land a job making 25 miles of 56 and 66 in. diam water conduit.

And Oregon Steel Mills, the state's lone steel producer, derives a pleasure from watching U. S. Steel Supply trucks back up to loading docks for a truckload of flats or angles which it can get more cheaply from Oregon than by rail from U. S. Steel's mill at Geneva, Utah.

Grew From Lumber

Perhaps the best known of Portland's manufacturing firms, Hyster Co., producers of materials handling equipment and Caterpillar tractor attachments, has developed from a small logging machinery company.

Hyster's best year was 1951 when it sold more than $30 million worth of machinery. Current sales are running ahead of that year and, while the boom is expected to level off near the end of the year, prospects of another sales record are good.

Portland's other major nationally known metalworking firm, Iron Fireman Mfg. Co., is making fractional hp motors and controls for its famous stokers and oil burners and is also doing some subcontract and defense program work.

Expansion Continues

Largest job shop in the area, Willamette Iron & Steel Co., is working on a new log-mounted winch which can snake 66 ton logs from sectors 500 ft back in the woods to the bucking areas.

Portland's Chamber of Commerce reports steady expansion of six new industries each month. Since the build-up area is not overly dependent on the vagaries of defense spending continued development seems assured.

HIGH ALLOY and stainless steel castings are produced at Electric Steel Foundry Co., one of Portland's largest foundries. Below, aluminum cable is inspected as it leaves closing die of a plantery type multi-stranding machine at Alcoa plant.

NAVY BARGE sections, below, are welded at Gunderson's Portland plant.

—Raw Materials—

IRON ORE: Fenimore

Dutch, German interests explore chances of mining Quebec Fenimore lode.

Fenimore Iron Mines Ltd., with iron ore concessions in northern Quebec, may have struck pay dirt. If present plans go through, this company—which has operated on a shoe string for many years—may not have to seek public financing to prove what it believes are good commercial iron ore possibilities on its properties.

Dutch and German interests have been talking seriously with Dr. Joseph Retty, Canadian explorer and geologist, who now heads the Fenimore Co. His company and N. V. Handels-En Transport-Maatschappij (Vulcaan) have gotten this far:

Terms of Understanding

¶ Vulcaan has the exclusive agency in Europe to arrange for financing and machinery to develop a concentrated iron ore from Fenimore's concessions.

¶ This Dutch firm—an international iron ore and coal marketing outfit—will sound out European interests to see if long term purchases can be expected. If so, talks with Fenimore will become more serious.

¶ Vulcaan will be the sole European selling agent for Fenimore if present plans for financing go through.

¶ Money and machinery, if arranged for by Vulcaan, will be repaid with iron ore concentrates at a price about $1.00 a ton below the market.

That much was made public recently.

Another large European interest had approached Fenimore after understandings were reached with Vulcaan. That firm was referred to Vulcaan for further information. This suggests some aspects of the plans are already operating.

Vulcaan has its own boats, its research staff, its sales and distributing organization and contacts with Dutch and German steel interests.

May Pan Out

Fenimore estimates a minimum tonnage of more than 550 million tons of iron bearing ores. These are not direct shipping ores but mostly siderite (carbonite form of iron ore). Dr. Retty says they are capable of uncomplicated concentration. The finished product would be around 60 pct iron in concentrated form.

The Fenimore concession lies at tidewater on Ungava Bay—part of the outlet of Hudson Bay into the Atlantic Ocean. Shipments can be made, according to marine authorities, for 4 months out of the year.

Dr. Retty says concentration of the ore can be carried on 12 months out of the year. He has poohpoohed the "Far North" stories about unbearable working climate.

Dr. Retty pioneered in the Quebec-Labrador iron ore deposits about 150 miles south of Fenimore's concession. He also discovered and mapped the ilmenite area north of Havre St. Pierre where a large titanium project is under way. Dr. Retty is staking his professional reputation on the validity of Fenimore's ore estimates.

U. S. Concession Open

At least one American steel firm is quietly looking over Fenimore as the result of Vulcaan's interest. Another steel firm has been approached. A large American iron ore marketing firm has been contacted also. Reason for these moves is that no firm has yet been assigned American rights for marketing and selling agreements. English firms will deal directly with Fenimore to the possible tune of 300,000 to 400,000 tons of concentrates a year, if plans go through.

Should the Vulcaan interest turn into firm contracts Fenimore would hope to eventually reach a shipping tonnage of 5 million tons of concentrates a year. Closing of a deal would eliminate public sale of stock for financing purposes. The enterprise would take on the aspect of an owner-consumer setup similar to Iron Ore Co. of Canada, which is composed of five American and two Canadian firms.

CREDIT: Loan Demand At Hot Pace

Consumers, state and local governments borrowing heavily . . . Interest rates are climbing high . . . Consumers' cash on hand up by similar percentage—By R. M. Stroupe.

Money like many other commodities is costing more these days. Unlike some other high-priced items, though, it's moving at a brisk pace.

Demand for monetary loans, Federal Reserve Board says, is very large. There is a "tremendous" demand for consumer credit. Likewise, state and local governments are borrowing "significantly" more than at this time last year.

Among business borrowers the picture is spottier. In the week ended May 20, the only segment of the economy showing a net increase in loans was the basic metals and metal products field. Amount of upward change was $6 million.

Won't Diagnose Trend

For the most part, industrial and commercial concerns were repaying loans in mid-May. Principal repayments were $23 million by commodity dealers, $16 million by public utilities, and $13 million by manufacturers of textiles, apparel, and leather goods.

Federal Reserve Board, while keeping a wary eye on the loan-and-repayment situation, is hesitant about saying whether the business health of the country is being imperiled by credit demands.

Excess reserves from the banking system form an important source of lendable money for both the private borrower and the government. Bank reserves, though highly flexible, recently have declined as the loan rate has risen, and bank holdings of U. S. securities have been on the downgrade.

Lendable funds are becoming increasingly important to Treasury Dept., which says it will need to borrow $8.8 billion in new money during the last half of the year. Unofficial estimates of Treasury's requirements run a few billion dollars higher. The amount Treasury will take represents a sizable dip into the credit pool.

Rumors of lower credit availability fail to alarm house builders.

Housing starts in the January-April period totaled 356,000, topping last year's total for the same months by more than 3000.

Just as important is the feeling among private lenders that there will be no let-up in the desire for home financing. In most areas, a rise in the non-GI loan rate is taking place. The GI and Federal Housing Administration rate was pushed up recently to 4½ pct.

Climbing interest rates are the order of the day and are not confined to the housing field. Industrial capital has become more expensive, causing a number of firms to put the brakes on expansion.

Nor are the rising rates peculiar to the U. S. They have been going up in Canada, most of western Europe, and South America since the end of World War II, as is shown in changes in the yield on long-term government bonds. In Canada the yield has gone up from 2.61 to 3.65 pct; in Denmark from 3.55 to 5.17 pct; and in Italy from 3.81 to 5.36 pct. The rate here is 2.83 pct.

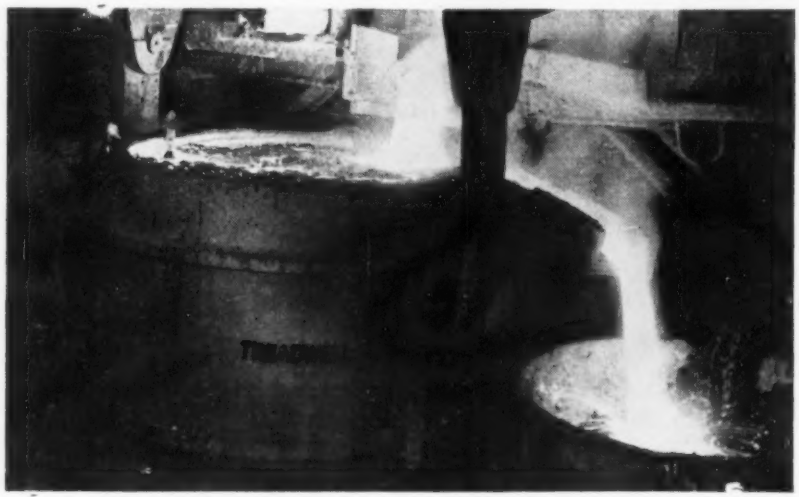
At the consumer level, principal factors are a high disposable income and high outstanding credit. Comparison with pre-World War II figures produces this result:

Slim Chance for Curbs

Outstanding consumer credit, installment and non-installment, in 1941 amounted to $8.8 billion, or 34 pct of the 1953 total of $25.7 billion. However, disposable income or the total of spendable money has risen in almost the same proportion. In 1941, the amount was $92 billion, or 37½ pct of today's total of $245 billion.

Analysis of this comparison indicates the degree of consumer indebtedness is less serious than some economists have pictured it. A further possible conclusion is that while disposable income continues high there is a good market for most consumer merchandise.

Chances for congressional action to place curbs on private buying credit are very slim. Terms of the overall controls bill (S. 1081) in the hands of the House Banking Committee provide that even emergency consumer controls cannot be slapped on unless a temporary price-wage-rent freeze is instituted. Moreover, Federal Reserve Board has made no strong effort to persuade the Banking Committee credit controls are needed.



NEW SHEET STEEL producer Pittsburgh Steel Co. last week started up its new 66-in. semi-continuous 4-high hot sheet and strip mill at Allenport, Pa. A 66-in. cold-rolled sheet-strip mill will start late this year. Top output of new mills will be 600,000 tons a year. First steel of new hot mill will go to automakers.

WAREHOUSES: Sales Ride Boom Crest

But despite hot and heavy steel sales volume, warehousemen are slowly building inventory . . . Expect a decline later and a struggle to hold their share of market—By W. V. Packard.

Steel warehouse people admit they never had it so good. Their business is still riding the boom tide while unprecedented shipments from the mills are raising their inventories slowly. Total inventory of 197 reporting warehouses is the highest it's been since Sept. 1, 1949.

No doubt warehousemen would be glad to wrestle with problems of shortage, unbalanced inventories, and topheavy bookkeeping for a long time—if their business could stay at current levels. But few of them believe this is possible. Here's what most of them expect, based on statements in Washington last week at the 44th annual meeting of the American Steel Warehouse Assn.

Meet Competition Later

Competition is returning and they are preparing to meet it.

Overall business is likely to remain good for some time, but as steel production catches up with demand warehouse sales are expected to decline from current record breaking levels. Although warehouse service is a firmly established part of steel distribution, steel retailers know they have their work cut out for them if they expect to hold anywhere near their present large (18 pct) share of total steel tonnage sales.

Like steel people, warehousemen fear price cutting during periods of abundant supply. With profit margins narrow in spite of huge volume, they realize that price cutting could quickly become painful.

To meet the heightened competition expected in the future, warehouse people are taking a careful look at their stocks, sales forces and methods, and customer lists.

When the urgency for steel begins to slow they will have to sell more actively to move tonnage. It will no longer be a question of whom should I take care of next? The question may later be how can I encourage my customers to buy more, or where can I help develop new uses and new users?

Size of warehouse orders is also likely to decline. According to Walter Doxsey, association president, the average warehouse order today is four times as great as it was before World War II. While much of this increase has been built on urgency, the trend toward high-output steel finishing mills leaves a larger area of the market which mills cannot directly service. For the steel industry, it has become increasingly uneconomical to roll and sell small shipments.

Sales Outlet Dispersal

After merchandising, service and inventory control, rising freight costs were cited as a grave problem. If not interrupted, this cost trend seems likely to continue fostering growth of secondary sales outlets located away from centers to take advantage of high freight rates. High cost of less than carload lots, a penalty shipping factor, will accelerate warehouse dispersion.

Warehousemen hope that recent experience under controls has resulted in convincing the government that warehouses, as the department stores of the steel industry, play a vital role in distribution—especially in providing emergency tonnage quickly. Also, the retail nature of warehouse business makes it wiser to control prices during emergency by means of permitted percentage markups, rather than by set dollars and cents ceilings.

A special panel representing steel producing companies discussed the outlook for supply of specific steel products. Consensus was that when warehouse people are finally able to get all the steel they want, they probably won't be able to sell all they can get.

J. V. Honeycutt, Bethlehem Steel Co., said the steel industry has adequate plate and structural capacity. He pointed out that plate production had increased greatly and that some users such as car builders faced shrinking order backlogs.

Logan T. Johnston, Armco Steel Corp., expects seasonal influences in auto and appliance industries to be felt in the third quarter of this year.

Spending:

More defense dollars going to foreign manufacturers.

Foreign nations will get Defense Dept. orders for $1.5 billion worth of communications and fighting equipment in fiscal 1954.

This program was outlined recently to a Senate group by N. E. Halaby, deputy to Assistant Defense Secretary Frank C. Nash. Mr. Halaby, who is in charge of European Mutual Security Affairs, also said that in the 15 months ended May 2 contracts for $1.43 billion worth of armaments were placed in 13 countries overseas.

By June 30 the value of contracts placed will have risen to $2 billion, he predicted.

Deliver to Allies

Under this offshore procurement program, the Defense Dept. buys foreign-made military gear and delivers it to U. S. allies. Fighting materials contracted for include high explosive shells and Mystere jet fighters from France; rockets and Hawker Hunter jet interceptors from Britain, and submarine nets and minesweepers from Italy.

Largest share of offshore contracts has been received by France, with Britain second and Italy third. Other nations participating in the program include Belgium, the Netherlands, Greece, Portugal, Denmark, Norway, Germany, and Turkey.

As of May 2, Army contracts placed in the 15-month period totalled $705 million. Navy contracts amounted to $345.5 million and Air Force almost $386 million.

Lines Ready for Atom Shells

Quantity production of atomic artillery shells is now possible, the nation's lawmakers were told last week.

Rep. John Jarman, D., Okla., who was among more than 100 Congressmen who watched the Army fire an atomic projectile from its 280-mm cannon in Nevada on May 25, said on his return to Washington: "Information was disclosed to us that the U. S. is now in a position to mass-produce the shells on our assembly lines."

Those missiles thus far used, he stated, were hand-constructed.

Jarman says the big gun and its shells give the Army "unlimited fire power."

Set Argon Expansion Goal

Office of Defense Mobilization last week set up an expansion goal calling for a total production capacity of 385 million cu ft of argon by Jan. 1, 1956.

This represents an increase of more than 300 million cu ft over the 80 million cu ft capacity in existence at the end of 1950.

Primary reason for the huge increase called for is the defense program which has sharply increased requirements for use in shielded electric arc welding of stainless steel, aluminum, magnesium and alloys.

Fabricated Structural Steel

Contracts, Shipments, Backlog

Estimated Net Tons

	1953	1952	Avg. 1947-1950
CONTRACTS CLOSED			
April	305,842	209,106	177,825
Year to Date	1,012,150	879,442	713,374
SHIPMENTS			
April	259,675	230,670	192,861
Year to Date	1,018,541	990,855	712,238
BACKLOG	2,167,758	2,350,974	1,190,607

Source: American Institute of Steel Construction

Contracts Reported Last Week

Including description, quantity, dollar values, contractor and address. Italics indicate small business representatives.

Shot, 76 MM, 110000, $1,071,400, National Supply Co., Pittsburgh.

76 MM gun carriage, var, $207,413, Standard Engineering Co., Ellwood City, Pa.

Computer-frequency, 60, $122,544, Hewlett Packard Co., Palo Alto, Calif.

Conversion test kits, 200, $210,000, The Denison Engineering Co., Columbus, Ohio.

Computer calibrator, 260, $177,700, Telectro Industries Corp., Long Island City, N. Y.

Primer, percussion, 469000, $228,032, Harper Wyman Co., Chicago.

Bomb, 834, $4,687,284, A. O. Smith Co., Milwaukee.

Shell, HE, 75 MM, 51900, $301,020, David Bradley Mfg. Works, Bradley, Ill.

Liner for deep cavity shell, 8461000, $406,128, Junior Toy Corp., Hammond, Ind.

Trucks, var, $4,528,618, Diamond T. Motor Car Co., Chicago.

Collar, 2850, $128,563, Diamond T. Motor Car Co., Chicago.

Magneto, w/gear, assy, wiring, harness complete, 2400, $90,437, Wisconsin Motor Corp., Milwaukee.

Bomb, photoflash, 44010, $1,146,020, Deere & Co., Moline, Ill.

105 MM gun mounts and spare parts, 478, $1,165,415, Pullman, Standard Car Mfg. Co., Worcester, Mass.

Projectile, practice, 20 MM, M99, 2500000 ea, $467,225, Pantex Mfg. Corp., Pawtucket, R. I.

Lids, tin, 10264184 ea, $60,456, Pacific Can Co., San Francisco.

Detonator, electric, 750000 ea, $296,250, National Fireworks Ordnance Corp., West Hanover, Mass.

Fin, shell, 8500 units, $285,570, Ribbonwriter Corp., Damia, Fla.

Lathe, engine, 10 ea, $138,487, The Sidney Machine Tool Co., Sidney, Ohio.

Detonator for fuze grenade hand, 1500000 ea, $28,320, E. I. duPont de Nemours & Co., Wilmington, Del.

Case, cartridge, 500000 ea, $1,643,356, Roller-Smith Corp., Bethlehem.

Internal grinding machine, 9 ea, $186,197, The Heald Machine Co., Worcester, Mass.

Replenishment of tank & combat vehicle parts, 2500, $59,697, Carron & Co., Inkster, Mich.

Replenishment of trucks, 29, $206,222, General Motors Corp., Pontiac, Mich., *J. P. McManus.*

Replenishment of trucks, 58, $67,284, Fargo Motor Corp., Detroit.

Replenishment of trucks, 821, $1,123,491, General Motors Corp., Detroit, *E. F. Gormsen.*

Replenishment of tank & combat parts, 10000, $76,000, Studebaker Corp., South Bend, Ind.

Replenishment of combat vehicle parts, 7000, $153,900, Blackstone Corp., Jamestown, N. Y.

Replenishment of combat vehicle parts, 6000, $202,380, General Motors Corp., Detroit, *R. C. Campbell.*

Replenishment of tank & combat vehicle parts, 1470, $77,175, Maremont Auto Prods, Inc., Chicago.

Replenishment of tank & combat vehicle parts, 52 pcs, $244,038, Midvale Steel Co., Nicetown, Pa.

Fuze, 10921, $1,933,017, Masco Screw Products, Dearborn, Mich.

Winch, double drum, 7 ea, $66,027, John C. Motter Printing Press Co., Columbia, Pa.

Steam cleaning rigs, 64 ea, $84,402, Aeroil Products Co., Inc., South Hackensack, N. J.

Road grader motorized, 10 ea, $91,500, Pettibone Mulliken Corp., Rome, N. Y.

Repair parts, rotary sweepers, 304 itm, $155,004, The Conveyor Co., Los Angeles.

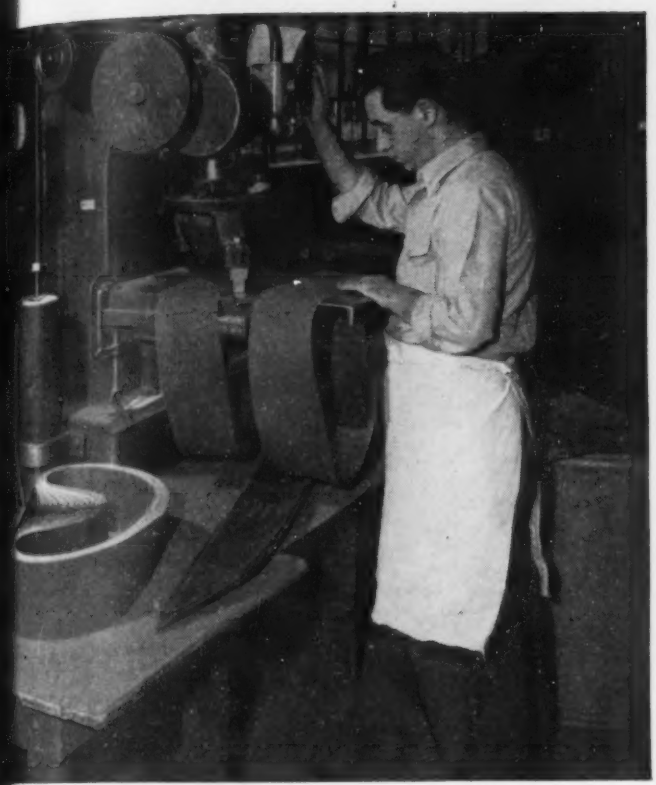
Crawler crane, 12 ea, $473,895, Harnischfeger Corp., Milwaukee.

Crawler crane, 17 ea, $793,484, Harnischfeger Corp., Milwaukee.

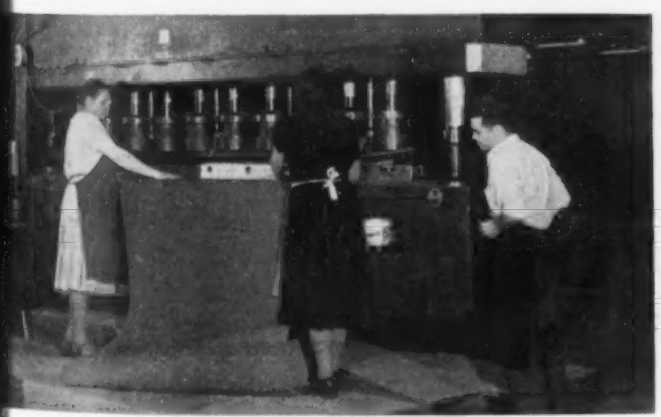
Crawler crane, 129 ea, $269,257, Harnischfeger Corp., Milwaukee.

Winch, double drum, 7 ea, $64,295, Skagit Steel & Iron Works, Sedro-Wooley, Washington.

SERIOUS PRODUCTION LOSS STOPPED BY SWITCH TO SUNVIS H.D. 700 OILS



VARNISH NO OBSTACLE—This is one of the many presses of various sizes which form joints in abrasive sanding belts for production use in the automobile, jet engine and woodworking industries, as well as many others. Six years ago equipment like this press needed costly maintenance at frequent intervals because of varnish formation. Then a Sunvis H.D. 700 Oil was adopted as the hydraulic medium, and the trouble disappeared like magic.



NO OIL CHANGE—This large press is used for joining abrasive belts used in polishing stainless steel. Although the oil temperature at which it operates is 130 F, the 200-gallon charge of Sunvis H.D. 700 is still in excellent condition after nearly four years' use.

Among the 30,000 types of abrasive specialties made by Behr-Manning Corporation, Troy, N.Y., Division of Norton Company, are sanding belts requiring smooth, uniform joints. Dozens of hydraulic presses, ranging in capacity from 5 to 150 tons, form the joints to the same thickness as the belts.

The hydraulic oil in use six years ago created a production obstacle by forming varnish in the pumps and valves. At least once a year the systems had to be overhauled and the pumps sent to the manufacturer for repairs, with consequent production loss.

Behr-Manning then changed to Sunvis H.D. 700 Oils, as suggested by a Sun representative. Because of the detergent-dispersive characteristics and high stability of these oils over a wide range of speeds, loads and temperatures, varnish formation was immediately cleared up. Since that time, no overhauls traceable to oil have been necessary. Annual savings in pump repairs have been substantial and no oil changes have yet been required.

For complete information about "Job Proved" Sunvis H.D. 700 Oils, fill out the coupon below.

SUN OIL COMPANY, Dept. IA-6
Philadelphia 3, Pa.

We are having trouble that may be caused by an inadequate hydraulic oil.

☐ Please send me booklet "Sunvis H.D. 700 Oils."

☐ Please have a Sun representative contact me.

Name_____

Title_____

Company_____

Street_____

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SUNOCO

Industrial Briefs

New Prexy . . . President of CHASE BRASS & COPPER CO., INC., Waterbury, Conn., Richard C. Diehl, has been elected president of the Copper & Brass Research Assn., New York.

New Company . . . ROCKWELL SPRING & AXLE CO. is a new company formed by consolidation of The Timken-Detroit Axle Co. and Standard Steel Spring Co.

Research Lab. . . . DOW CHEMICAL CO. has opened a new research laboratory to be known as Edgar C. Britton Research Laboratory, named in honor of its Organic Research Laboratory director.

Simplifying Things . . . ALUMINUM CO. OF AMERICA liquidated the Alcoa Mining Co., a wholly-owned subsidiary, on May 31st to simplify the parent company's corporate structure.

Contract Signed . . . NATIONAL STEEL CORP. has signed a contract with American Shipbuilding Co., Cleveland, for construction of a new lake freighter.

Vote of Thanks . . . WESTINGHOUSE ELECTRIC CORP. has awarded its Order of Merit to A. M. Fisher, northwestern district industrial department manager, Chicago, for "distinguished service and outstanding leadership."

It's Official . . . Name of Jessop Steel Co., Ltd., was officially changed to JESSOP STEEL CO. OF CANADA, LTD., recently.

New Facilities . . . ENTHONE, INC., New Haven, Conn., has increased manufacturing and warehousing facilities at its plant at 442 Elm St.

Jet Fighter . . . CHANCE VOUGHT AIRCRAFT DIV., United Aircraft Corp., has won a design competition for a new Navy Day fighter from Navy Bureau of Aeronautics.

New Quarters . . . Airsupply Co., a division of THE GARRETT CORP., has moved into new and enlarged quarters at 9815 Wilshire Blvd., Beverly Hills, Calif.

Albany Distributor . . . REYNOLDS METALS CO. has appointed Eastern Chemicals, Inc., distributor in Albany.

Chicago Branch . . . AMERICAN MACHINE & FOUNDRY CO. has opened a Chicago branch office at 520 N. Dearborn St.

To Be Built . . . A new steel mill, planned for an eventual capacity of 400,000 tons of finished products a year, is to be constructed at Vitoria, in the state of Espirito Santo, Brazil.

Extends Line . . . THE COOPER ALLOY FOUNDRY CO., Hillside, N. J., has extended its product line to include plastic pumps, valves accessories and fittings.

New Division . . . ROCKWELL MFG. CO., Pittsburgh, has established a separate division for manufacture and sales of a new air-hydraulic drill unit.

Order Received . . . ACF-BRILL MOTORS CO., Philadelphia, has received an order for six new diesel-powered intercity coaches from Quaker City Bus Co.

Elected . . . CLEVELAND ENGINEERING SOCIETY has elected Ralph R. West, president, West Steel Casting Co., president of the Society.

Change Made . . . Taco-West Corp. recently changed its name to WEST INSTRUMENT CORP.

Certificate Awarded . . . Edward H. Platz, Jr., manager of alloy sales, LEBANON STEEL FOUNDRY, Lebanon, Pa., was awarded the Certificate of Service by the Dept. of Commerce, Washington, D. C., recently.

Vote of Thanks . . . NEWPORT STEEL CORP. held a dinner recently honoring 461 men and women who have spent 25 years or more of continuous service in steel operations at Newport and Wilder, Ky.

"Driver of the Year" . . . S. R. Burkholder, driver for Garrett Freightlines, Inc., recently received the TRAILMOBILE INC. "Driver of the Year" trophy.

Construction Plans . . . INTERNATIONAL BUSINESS MACHINES CORP., reports that plans are nearing completion for the construction of a new building in Endicott, N. Y., which will add 139,200 sq ft to the existing manufacturing facilities.

Summer Vacation . . . Tennessee Coal & Iron Div., U. S. STEEL CORP., has terminated for the summer months its public plant tour program.

Chrysler Goes Heavy on Light Metals

Widest auto use of aluminum and magnesium is by Chrysler divisions . . . Ford, Chrysler follow GM lead in signing with UAW . . . Kaiser cuts Henry J price tags—By *R. D. Raddant.*

It is generally conceded that Chrysler Corp. makes the widest use of the light metals—aluminum and magnesium specifically.

This is not just to make cars lighter, but because of a growing philosophy that weight in an automobile means cost. This is particularly true in the addition of an "extra" like an automatic transmission with its large housings.

Newest Use . . . A good illustration of the adaptation of aluminum is found in Plymouth's Hy-Drive transmission, the most recent of the automatic transmissions to come into the auto field. Stators in the converter are precision aluminum castings while both the large transmission and clutch housings are die-cast aluminum.

Together the two housings weigh only 21 lb. Using die-cast aluminum for this purpose is not new in Chrysler Corp. But adapting it to the new Plymouth transmission rounded out the entire corporation in using aluminum transmission housings.

Could Switch . . . Why not magnesium? It has become competitive with aluminum for die-cast parts. Chrysler engineers have done as much work with magnesium as any in the industry and have experimented with magnesium housings with success.

In this case a rush job with only 90 days to get ready for the Hy-Drive was one reason. Aluminum availability was good and two suppliers of the castings were ready to produce with aluminum. Furthermore, if there should be a decision to switch to magnesium, it can be run on the same dies. This would not be true in a switch from magnesium to aluminum.

Tool Up Rapidly . . . In this instance Plymouth mechanics did a fast job in preparing to machine the castings in 3 months after the decision to produce Hy-Drive was reached. There was no time to order new tools, so they improvised quickly with what was available within the plant.

The torque converter Hy-Drive requires the use of the clutch pedal to switch from neutral to high gear, the all purpose driving position. But it has a higher torque multiplication than the standard Plymouth low gear. The Hy-Drive ratio is 2.6 to 1 against 2.57 to 1 in standard low gear. This means excellent pickup.

Automotive Production
(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
May 30, 1953	109,434*	17,835*
May 23, 1953	140,060	22,387
May 31, 1952	80,996	23,939
May 24, 1952	99,101	28,658

*Estimated Source: *Ward's Reports*

Still Fear Fire . . . Getting back to magnesium, there is still a great deal of resistance in the auto industry to its use, despite the fact that it is competitive in cost and lighter in weight than aluminum.

Magnesium producers contend that there is little or no danger of fire, but many in the auto industry are unconvinced and this includes workmen.

But it should be kept in mind that wherever die-cast aluminum is mentioned, it is a safe bet that die-cast magnesium is also being considered for the role.

Big Three Sign Up . . . One by one the Big Three fell in line. Following General Motors' agreement to revise the 5-year pact with the United Automobile Workers, first Ford, then Chrysler reached speedy agreement.

But while the GM settlement contained no mention of pensions, both Ford and Chrysler upped their pensions about $7 to a maximum pension of $137.50 per month. GM immediately granted similar pension concessions to bring GM pensions in line with the new levels.

Chrysler also agreed that retired employees be permitted to purchase hospital-surgical insurance benefits at group rates.

Skip Pay Cut . . . By making a fast transfer from the old to new BLS cost-of-living index, the auto workers also avoided a 2¢ per hr pay cut. This would have descended on them at the June 1 quarterly adjustment had the old index been extended. Transfer to the new index was a main point of all agreements.

Ford and Chrysler also granted 20¢ raises to pattern makers and die sinkers. GM granted 10¢ to all skilled workers without special rates for these two categories.

Other points, agreed to by all the Big Three, included lifting the floor of the basic wage 19¢ of the 24¢ per hr that had been added under the escalator clause and increasing the annual improvement factor from 4¢ to 5¢.

Independents will be next.

Now It's "Kaiser Motors" . . . Little semblance remains of the original Kaiser-Frazer Corp. that in 1945 took on the entire auto industry. It was loaded with confidence of cracking the most competitive business in the world.

Even half of the name, Frazer, will be erased. The company is now known as Kaiser Motors Corp.

Joseph W. Frazer, who had served as a top executive in several auto companies, was the first president of K-F. More than a year ago, however, Edgar F. Kaiser,

ew president, said there was no eal reason for keeping the Frazer ame. Although still a "consul- ant," Mr. Frazer had long ago evered connections with the com- any he helped found.

Trim Car Prices . . . The name hange was one of several actions aken at the K-F stockholders neeting last week, the first since he company purchased Willys-Overland. The purchase and new financing had the effect of mollify- ng most of the hostile Stock- olders Protective Committee. Its hairman notified the board it vo uld recommend that its activi- ies be suspended.

In one of the first actions fol- owing the stockholders' session, Kaiser announced price cuts on he Henry J Corsair and Henry J Corsair Deluxe of $100 and $125 respectively. The Corsair price is now $1399 f.o.b. Detroit.

GM Answers UAW . . . The president of General Motors laid down some of the ABC's of auto- motive competition last week. The occasion was a reply to Walter P. Reuther, president of the UAW and its parent CIO. He had re- cently blistered the auto industry for allegedly cramming 60 pct of its production into the first half of the year.

The crux of Harlow H. Curtice's reply was contained in his final point.

"We expect that employment in our various plants will continue at approximately current levels throughout the balance of this year. If, however, because of eco- nomic factors or conditions beyond our control, which we cannot an- ticipate, there is any reduction in production and consequently re- duction in employment, our failure to maintain a reasonable produc- tion at this time to obtain a fair share of the market will not in any way lessen the impact of such other factors," he wrote Mr. Reuther.

Buyer is Boss . . . Mr. Curtice pointed out that 15 pct of total hours worked since the first of the year are overtime hours. He added that in the auto industry, the cus- tomer controls output volume.

"I do not share the pessimistic view and apparent lack of confi- dence in the economic future of our country expressed in your let- ter," Mr. Curtice stated. "To the contrary, I am quite optimistc as I look ahead."

All this means that in the auto industry you have to build them when you can sell them. It was also another statement of GM's opinion of a strong market.

Fast Growth Marks Use of N-A-X

An outstanding development in automotive steel is the rapid growth in use of Great Lakes Steel's low alloy high strength bumper steel trade-named N-A-X High-Tensile.

Introduced in 1938, it has devel- oped from a token tonnage in 1939 to today's 23 pct of ingot output. Every make of passenger car in the U. S. now uses N-A-X in bumpers.

Schedule June Corvette Debut

Reports indicate that produc- tion of the Chevrolet Corvette is close to schedule and that the first of the production models may be out before the end of June.

This fiberglass sports car that stole the show at General Motors' Motorama is the only one of GM's four experimental plastic jobs that is close to production.

Buick has just completed its second Wildcat and Oldsmobile is nearing completion of its second Starfire. It is believed that Cadil- lac has made several models of the Le Mans.

To date Chevrolet has com- pleted three Corvettes. One is still with Motorama. A second is currently appearing at Indian- apolis. No. 3 is at the GM Prov- ing Ground for test by Mauri Rose, the famous race driver.

The Corvettes will be assembled at Flint. Manufactured panels will be completed by the Molded Fiberglass Co. in Ashtabula, Ohio, shipped to Flint for assembly.

THE BULL OF THE WOODS — **By J. R. Williams**

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... TONGS FOR EVERY GRABBING PROBLEM

Consider New Small Business Agency

Would replace expiring SDPA . . . House bill authorizes $150 million loan total, $100 million other spending . . . Bankers oppose bill . . . Weeks would cut funds—*By G. H. Baker.*

Smaller metalworking firms may soon find a brand new government loan outlet operating to fill their financial needs. If legislation now being considered by the House becomes law, the new federal lending agency will be armed with permanent authority to lend up to $150 million (total of all outstanding loans permitted at any one time) to small business.

Tentative title for the new agency: Small Business Administration. It would succeed the present Small Defense Plants Administration, which is scheduled to expire June 30.

Bankers Oppose Bill . . . House bill further authorizes the SBA to spend up to $100 million in procuring defense contracts which may be subcontracted to smaller companies. Secretary of Commerce Weeks also is in favor of this provision, but he thinks the fund for this purpose should be limited to $50 million.

American Bankers Assn. is opposing the bill on the ground that there is plenty of capital available at banks. The nation's lending institutions are well able to meet all loan requirements, and there is no need for the government to extend its activities in this area, the ABA states.

Coal Goal in Sight . . . Recent certification of more than $18.5 million in metallurgical coal and coke expansion projects for rapid tax writeoffs has brought coal production within sight of defense expansion goals but not so in the case of coke.

Included in recent certifications were plans by Youngstown Sheet & Tube Co. for a $10 million expansion in coke and coal and a $7.9 million coal project by the Harmer Coal Co. of Pennsylvania.

Projects which had been certified through May 1 are estimated to provide a net capacity of 17 million tons of coke above the estimated 74 million tons as of 1950.

Boost Target . . . Original goal as established in late 1951 foresaw a need of a total annual capacity of 84 million tons. Early this year, the figure was hiked to 85.8 million net tons.

Initial target for metallurgical grade coal capacity has also been boosted and now stands at 139,750,000 net tons. Defense Solid Fuels Administration says this will be reached by end of 1953.

But the coke goal won't be reached soon, DSFA admits. Biggest reason is that substantial tonnages of previous and existing capacity are being lost through retirement because of obsolescence.

Earliest date DSFA now sees for achievement of the by-product coke oven capacity goal is Jan. 1, 1955 despite the incentive of industry having had close to $650 million certified for rapid tax million in fast tax writeoffs.

"He can't take shorthand or type, but what a secretary I've got!"

Set Precedent . . . Labor unions may properly challenge the bargaining rights of another union whose officer has been convicted of false statements in his non-Communist oath, the National Labor Relations Board has ruled.

In a precedent-setting decision, the NLRB ruled that failure of any union or its officers to tell the truth with respect to the non-Communist oath provisions of the Taft-Hartley law makes it "fair game" for displacement by another union.

Decision grew out of a case involving the CIO Packing House Workers and Knox Gelatin, Camden, N. J.

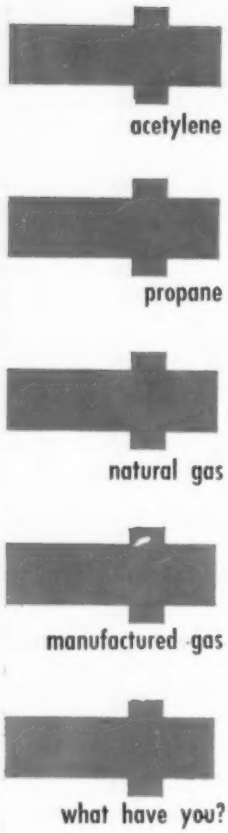
Study Preparedness . . . Proposal for the creation of a special task group from the 1 to 500 hp motors and generators industry to work with the government in making a preliminary study of the industry's mobilization readiness was approved last week by the industry's advisory committee.

Whether a full scale study will be made depends on the report of the special group. It will report back at the next meeting.

Some industry members question the value of a long range study because of the changing requirements of the military. But government officials feel that "realistic appraisals" of needs for components is equally as important as for assembled end items.

Authorize Metal Spending . . . Mutual Security Agency last week authorized the United Kingdom to spend $20 million in purchases of aluminum, aluminum base alloys, and aluminum products. All will be supplied by Canada.

At the same time, Italy was authorized to spend $5 million for copper and copper products.



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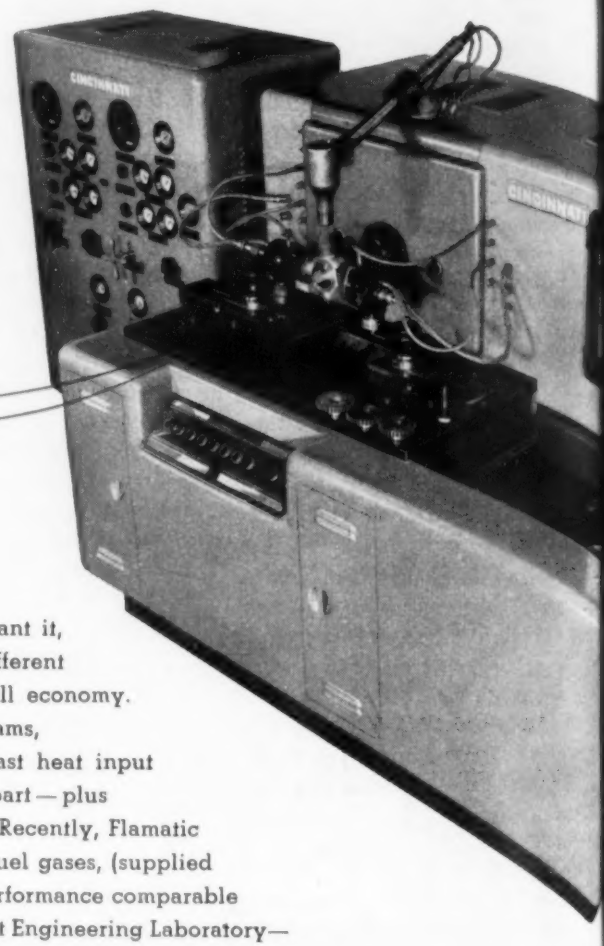

Now you can get the **hardness** you want, **where** you want it, on either high production quantities or small lots of different parts, and use the fuel you choose for maximum overall economy. Flamatic performance in selective hardening of gears, cams, camshafts, crankshafts, cutters, snips, etc. comes from fast heat input with high temperature flames to specified areas of the part — plus electronic temperature control for uniformity of results. Recently, Flamatic developed a compressor unit to bring a wide range of fuel gases, (supplied at low line pressures), up to pressures which provide performance comparable with acetylene and propane. The Cincinnati Flamatic Heat Engineering Laboratory—now in a large new building—is better-than-ever staffed and equipped to analyze your surface hardening needs, experimentally Flamatic harden, and make practical recommendations.

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POWER: Private Industry Takes Reins

Boom for next 2 to 3 years in private power . . . Will spend $4 billion . . . Government seen relaxing grip on power monopoly . . . Green light on Hell's Canyon—*By A. K. Rannells.*

A continuing boom in private power development is indicated over the next 2 to 3 years. On the basis of current costs, industry will spend a minimum of $4 billion in this period.

Meanwhile, the drift by the government in recent years toward a federal water power monopoly is being braked to at least a walk.

Recent moves have pointed up a change in governmental thinking. For example, Interior Dept. has withdrawn opposition to a pending application for private development of facilities in the controversial Hell's Canyon area.

Still Short of Goal

And more recently, Interior Secretary McKay has ordered liquidation of Defense Electric Power Administration by June 30.

Such moves aren't necessarily a trend. And they don't mean that the government is getting out of the power business.

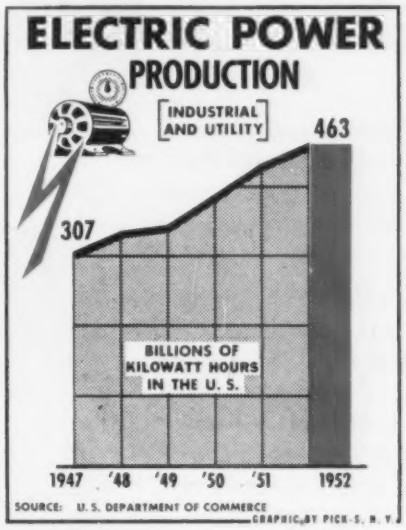
For one thing, power generating facilities are far short of the goal which the Office of Defense Mobilization believes is necessary to support the present mobilization base.

This target, already revised upward, is likely to be raised again before the target date of 1955 as new aluminum facilities and other manufacturing plants go into production, and other power requirements develop. Government could still step in if it had to.

But it does mean that since privately financed expansion programs are picking up speed, the new Administration is going to take a serious look at the whole picture. It intends giving industry a chance to go ahead on a put-up or shut-up basis.

Belief is that power development is best left to industry and private capital. If the Federal Government must step in, present Interior Dept. thinking is that it should be on the basis of helping state or local development.

Under Secretary McKay, Interior Dept. is likely to confine federal water resource development to multiple-purpose projects involving indirect benefits such as aid to navigation, flood control, irrigation, and others. These can't be charged back directly to those who benefit nor can private enterprise be expected to assume responsibility.



It looks like industry, now given the incentive of less government competition, intends to come through. Plans have already been okayed for 97 pct of power expansion now seen as essential for national security.

Class I generating capacity (not counting industrial production for use) stood at about 67,500,000 kw as of Jan. 1, 1951. Enough new capacity was installed during 1952 to raise the figure to 75,000,000 kw.

Meanwhile, a special industry advisory committee had been set up to make a survey. On the basis of the committee report, an expansion goal of 107,000,000 kw was established—an increase of 32,000,000 kw above 1950 capacity.

Power shortages last year, plus expansion of the aluminum and other large power-consuming industries, resulted in raising the original target by 6,500,000 kw to 113,500,000 kw. New target date is Jan. 1, 1956.

At the beginning of 1953, total installed capacity had climbed to the 81,500,000 kw mark. This left the program still 22,000,000 kw short of the new target.

In order to reach the present goal, the industry is faced with the problem of installing 9,500,000 kw in new capacity this year, 10,500,000 kw next year, and 12,000,000 kw in 1955.

Can—and—will industry make it? It looks like the answer is "yes," now that there are prospects of less government competition in the field—and if labor and materials are available.

Latest available figures (as of May 1) show that more than 600 applications for tax amortization have been approved. There are more than 60 still in the stage of being processed.

They cover nearly $5 billion worth of construction, including work already completed.

NPA Works Overtime on Decontrol

Decontrol orders were rolling from National Production Authority as the agency prepared for transition from CMP to the Defense Materials System.

Most of the orders were routine since virtually all materials controls will end June 30 except for necessary military and defense priorities.

Wiped out were M-86 and M-82 which provided control of distribution of copper wire and brass mill products. Inventory limitations under the two orders end immediately but the other provisions continue until June 30.

Interim orders M-47A and M-47B, which affected use of steel, copper and aluminum for manufacture of stoves, refrigerators, and other civilian hard goods, have been revoked, effective June 30.

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Multipress offers a *wide* choice of manual and automatic ram controls for every need . . . *accurately* adjustable ram speed, pressure, and stroke length . . . oil-smooth operation that reduces wear and tear on tooling—plus a full range of sizes and capacities from one ton to 75 tons.

And now Multipress is available *in all sizes* with Denison's new Touch Control.

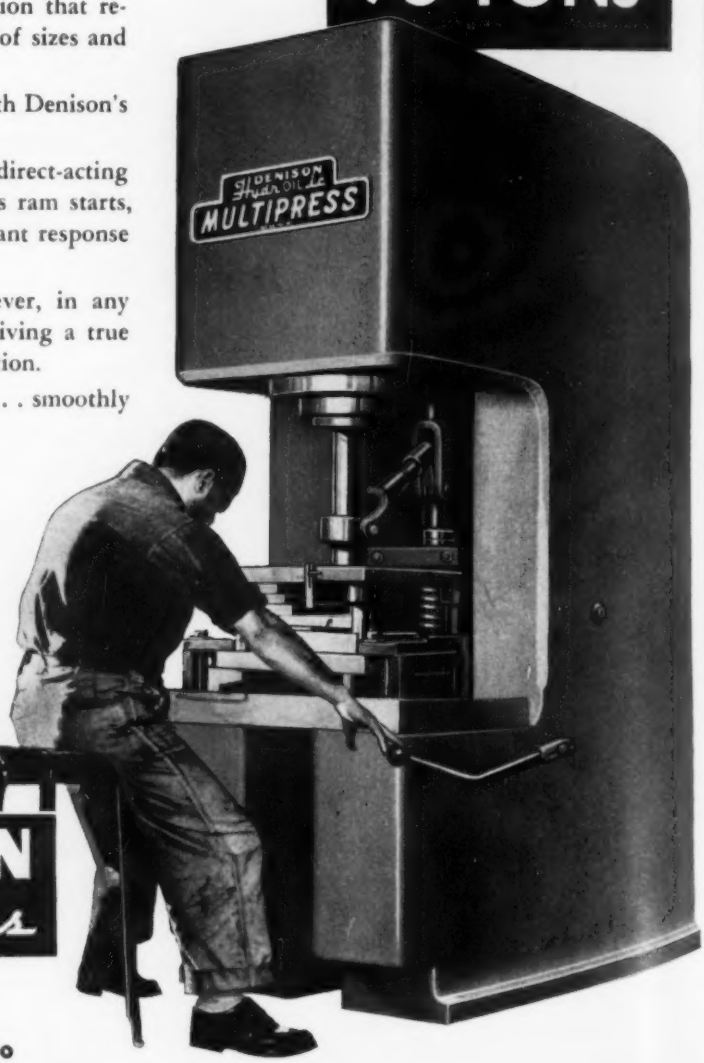
Touch Control gives operators complete, rapid, direct-acting regulation of ram movement and effort—the press ram starts, stops, reverses, accelerates or slows down with instant response to every *movement* of the Touch Control lever.

Pressure applied to the "Touch Control" lever, in any degree, is instantly multiplied in ram pressure—giving a true control "feel" of the pressure needs of any operation.

Ram effort can be built up rapidly or slowly . . . smoothly or in stages . . . and can be held at any tonnage for any needed dwell period. Applied pressures are shown on the dial gauge.

In addition, Multipress offers standard auxiliary feeds, tooling attachments and accessory equipment for many specialized production needs.

Write today for complete information on Multipress and the many types of Multipress controls, features and accessories — including the new Touch Control!



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The DENISON Engineering Co.
1158 Dublin Road, Columbus 16, Ohio

Summer Steel Demand Stays Strong

Western steelmen predict capacity operation through third quarter for most items . . . Sheets, shapes and plates tightest . . . Reinforcing bars, wire goods ease—*By T. M. Rohan.*

Western steel sales executives are confident of continued capacity operation through the third quarter in most products.

Speakers at the purchasing agents' convention in Los Angeles last week (see p. 91) predicted strong demand in almost all categories. Notable exceptions are reinforcing bars, wire rods, drawn wire and wire products, standard drop forgings, and nuts and bolts.

Shapes Stay Short . . . Addressing a special steel session, S. S. Cort, Bethlehem Pacific sales manager, said demand for structural shapes continues to exceed supply despite top production. Wide flange sections especially show heavy demand, possibly through the fourth quarter.

Rolling schedules for standard shapes are full but demand will drop, possibly in the third quarter. Steel piling orders are booked for the remainder of the year.

Forges Sold Out . . . High western capacity for reinforcing bars puts them in easy supply; nationally, mills are booked through the year. Drop and press forging shops are at about 75 pct capacity but there are a few bottlenecks on large die blocks and nickel and moly alloy bars. Time on forges over 3000 tons is sold out through the year.

The historic western plate shortage will continue through the year and hot and cold rolled sheets show little sign of improvement, the PA's were told in another report. Galvanized sheets and hot rolled strip are in better supply but far from a glut on the market.

Plates Go West . . . Plates and flat rolled products will be rolled at capacity in the West. Eastern demand for these is based on auto, appliance and construction activity. But autos and appliances are expected to fall off a little, loosening the eastern market and bringing more hot and cold rolled sheets west.

First quarter building permits in Los Angeles alone led the nation at $127.5 million ($29 million over New York), promising continued high plate demand. Heavy western plate tonnage is also going into expanded line pipe, further heightening demand.

Lowered farm income is slowing the galvanized demand and a buyer's market is expected in the third quarter. Western hot rolled strip is in easy supply while midwest and eastern stocks are short.

Rolling Along . . . Northern California auto assembly is racing into the big leagues. Chevrolet's Richmond plant this week is turning out its 2 millionth car with gala celebration. And in neighboring San Leandro, Chrysler is opening its new Dodge-Plymouth plant, will produce its second million cars in California using body assembly there for the first time.

"You're snow-happy Halihan—there are no elephants in Alaska!"

Issue New Stock . . . Seidelhuber Steel at Seattle is floating a new $200,000 preferred stock issue for operating capital. President Frank V. Seidelhuber, Jr., reports advance commitments for about half which will be sold when state approval is granted.

Local financial circles say investors are willing to put up the money for the local industry. The firm also hopes to get an additional pending $565,000 Reconstruction Finance Corp. loan.

Kaiser Triplets . . . Kaiser this week blows in its third identical 1200-ton blast furnace at Fontana, increasing rated pig capacity 50 pct or about 1.3 million tons annually. Iron ore output at Eagle Mountain, 164 miles away, will be stepped up to 2.25 million tons annually when full production is reached. The blast furnace is latest step in an overall $65 million Kaiser expansion program.

Train on Job . . . Aircraft builders are giving on-the-job training to about 27,000 employees to reduce the continuing shortage of mechanics, machinists, and other skilled workers.

Aircraft Industries Assn. says this development of employee skills is going on in 86 aircraft plants. Progress in the training field has been noted by the Labor Dept. Bureau of Apprenticeship, which has found that management is placing greater emphasis on instruction of new workers (THE IRON AGE, Jan. 22).

AIA notes a growing need for diversified skills in the plane, engine, and parts fields. In 1946, it says, one firm made only piston engines and listed 2432 separate jobs. Now the same company, building turbojet, ramjet, turboprop, and piston engines, has a list of 3051 jobs.

. . . *but*

Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate — without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!

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Two-Way Street to More Productivity

Tool builders, metalworkers strive for increased productivity . . . Reduce parts handling and lower cutting times . . . Jones & Lamson run industry educational program—By E. C. Beaudet.

Increasing productivity is probably the most important single factor in enabling manufacturers to keep the price of their products within reach of the nation's large mass of consumers.

With materials and labor costs steadily rising and no end yet in sight, more production per labor hour remains the prime area in which savings can be achieved and passed on to the customer.

Attractive prices on consumer goods makes for stronger purchasing power. For a country which is capable of producing about 30 pct more goods than it can consume, the purchasing power of its citizens must remain healthy.

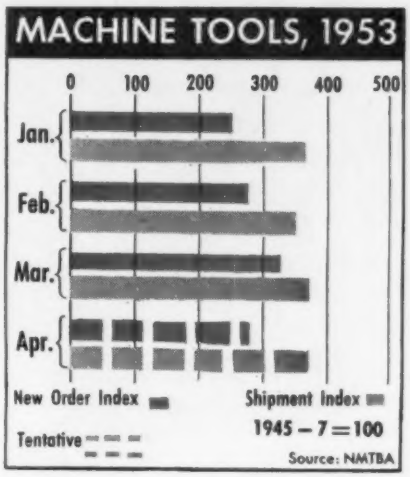
Increase Productivity . . . In the machine tool and metalworking field efforts to increase productivity are being approached from two directions. There is one group that believes a reduction in parts handling offers the greatest opportunity for reducing over-all floor-to-floor time.

Working from another direction, but reaching the same result, are those who believe the answer is lowering actual metal cutting time. The most logical answer, lies in a combination of the two approaches.

Holds Promise . . . Continuing efforts in both directions to increase productivity give promise of a great new era of metalworking production. If the progress at times seems to be taking place slowly it is because people must be shown that new ideas and methods are practical and will withstand the ultimate test of production.

To overcome some of the inertia in regard to high velocity machining, Jones & Lamson Co., Springfield, Vt., believes a sound educational program is necessary. The company, which became convinced during World War II that steel could be turned with carbides at a much higher rate than was then common, has embarked upon such a plan.

How It Works . . . Each month groups of 18 or 20 production men, processing, methods, and time study engineers are invited to the J&L plant for a 2-day session on high speed turning. The education program consists of classroom lectures and demonstrations and plant tours to see high speed jobs being run.



Question - and - answer sessions give visitors an opportunity to present their individual problems. Skeptics are encouraged to air their views in public.

Use Films . . . A recent addition to the program is a 27 min. color film produced by J&L covering research in the field of high-level metal turning. A series of high-speed motion pictures taken at 3000 frames per sec show 3/16-in. thick disks of C 1118 steel being turned at 150, 300, 600 and 1200 surface fpm.

In the lecture room examples of high speed jobs presently running in plants are described. Included in these examples is the Ford gear pinion forging made of 8620 steel. Originally estimated to run at 600 sfpm, this forging is now running in production at 1200 sfpm.

Another example relates the machining of 52100 steel bearing races at velocities from 600 to 700 sfpm (THE IRON AGE, Mar. 6, 1952, p. 224; Nov. 6, 1952, p. 180).

What They See . . . In the plant visitors see such work as 1141 medium alloy steel being turned at 560 sfpm and 2¼-in. diam stock of cold drawn stainless material run at 600 sfpm in normal plant production.

J & L believes that educating key production men is one of the best methods of spreading the practice of high speed machining. They believe new standards for turning must be adopted if productivity is to increase. When these men return to their plants they will relate their experiences to those further down the line.

Operators who have been running a job for years at 250 to 300 sfpm cannot be expected to revise their thinking overnight. In most cases they have to be shown. They will be more receptive to these new ideas if they realize those above them have seen them work out and have confidence that new techniques and methods can be applied in their plants.

Don't Object . . . Jones & Lamson have found that tool operators have no objections to turning out more pieces if provisions are made to eliminate fatigue.

On most of its high level turning operations the company incorporates full sequential control so that the operator is only required to place the work piece in work holding supports, press a button, and remove when finished.

Pressure Processing

. . . whoever uses it in their production is a customer or potential customer of **H-P-M**

Taming Temperamental MAGNESIUM . . . a Cinch with All-Hydraulic H-P-Ms!

The Emerson Electric Mfg. Co., St. Louis, draws thin magnesium alloy sheets to a depth of 30". To meet the demands of this difficult job, which calls for accurate control of heat, speeds and pressures, H-P-M designed and built this 600-ton *all-hydraulic* press incorporating an extreme range of accurate, stepless speeds (0" per min. to max.) and pressure controls.

When it comes to solving tough production problems . . . it will pay you well to talk shop with an H-P-M engineer about *all-hydraulic* pressure processing and H-P-Ms. Write today!

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Continued

Milling, centering

Motch & Merryweather's three-station Duplex Milling and Center Drilling Machine performs the complete operating cycle of loading and unloading, duplex milling and double-end center drilling simultaneously. Milling and center drilling operations are said to be unitized in a new and advanced form in which the workpiece is held stationary. Details are contained in a new bulletin. *Motch & Merryweather Machinery Co.*

For free copy circle No. 14 on postcard, p. 117

Bricks, sticks, stones

Abrasive bricks, sticks and stones are illustrated and described in a new brochure. Among the items covered are rubbing bricks, abrasive sticks, dresser sticks, scythe stones, jointer stones, sharpening stones and specialty stones. Items are specified by catalog number for easy identification and ordering. *Simonds Abrasive Co.*

For free copy circle No. 15 on postcard, p. 117

Zinc dust

Common applications of zinc dust are described in a new bulletin. Details are given on the advantages of zinc dust as a reducing agent, as a catalyst, a purifier and as a rust preventive. *American Smelting & Refining Co.*

For free copy circle No. 16 on postcard, p. 117

Dust collector

Engineering features of Pangborn's Type Ch-3 self-cleaning cloth screen dust collectors are presented in a new brochure. These units use the reverse air flow principle for continuous cleaning of the cloth filters. *Pangborn Corp.*

For free copy circle No. 17 on postcard, p. 117

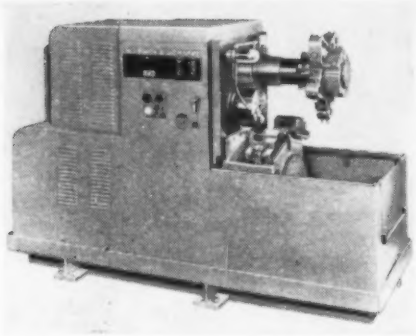
Bushing prices

Randolph Graphite Bearings, Inc., has released a price catalog on its varied line of bushings. Included are bronze bushings, graphited bushings and bronze bars. *Randall Graphite Bearings, Inc.*

For free copy circle No. 18 on postcard, p. 117

NEW EQUIPMENT

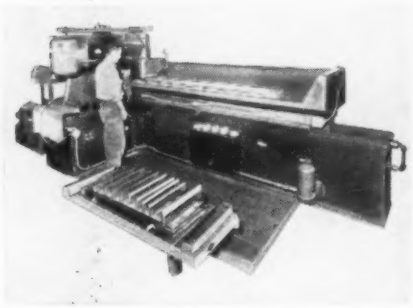
New and improved production ideas, equipment, services and methods described here offer production economies . . . just fill in and mail the postcard on page 117 or 118.



Single spindle automatic handles large work

The 2-AC single-spindle automatic chucking machine has been designed for high efficiency operation in diversified production. It features front and rear cross slides and a five-faced overhead turret, and handles work up to 10½ in. diam and up to 9 in. in turned length. Trip blocks are simply positioned in the slots of a pentagonal drum at the rear of the turret shaft to control feeds, spindle speeds, length of cutting stroke and skip indexing. Either or both cross slides can be selected to operate with any or all turret faces. Spindle speed range is from 40 to 1102 rpm; 36 feeds from 0.0019 to 0.124 in. *Warner & Swasey Co.*

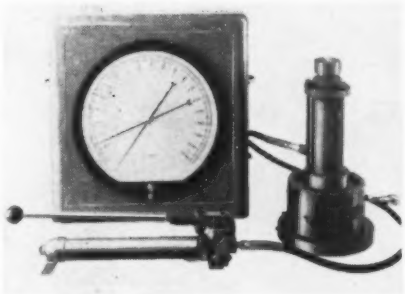
For more data circle No. 19 on postcard, p. 117.



Knife grinder eliminates burning hazard

New Cleveland hydraulic surface grinders of interest to users of bevel edge cutting and trimming machine knives present a new surface grinding principle that eliminates the hazard of knife burning, besides being fast and extremely accurate. The machine grinds straight and concave bevels of any desired angle or straight flat surfaces within its capacity. The grinders are specially suited for finishing or regrinding bevels and they are particularly recommended for sharpening high alloy machine knives. Any degree of bevel can be finished. *Hill Acme Co.*

For more data circle No. 20 on postcard, p. 117.



Portable thrust system has 50-ton capacity

Calibrated linear thrusts of up to 50 tons can be applied in any direction with the new portable force metering system. It permits direct weighing of bridge, structure, and other large loads, allowing an exact force to be applied anywhere in plant or in the field. It precisely weighs the force as it is applied. Force is exerted by a hydraulic jack, mounted on a hydraulic cell. Output of the cell is shown on load indicator, in pounds, kilograms, or any arbitrary units desired. *A. H. Emery Co.*

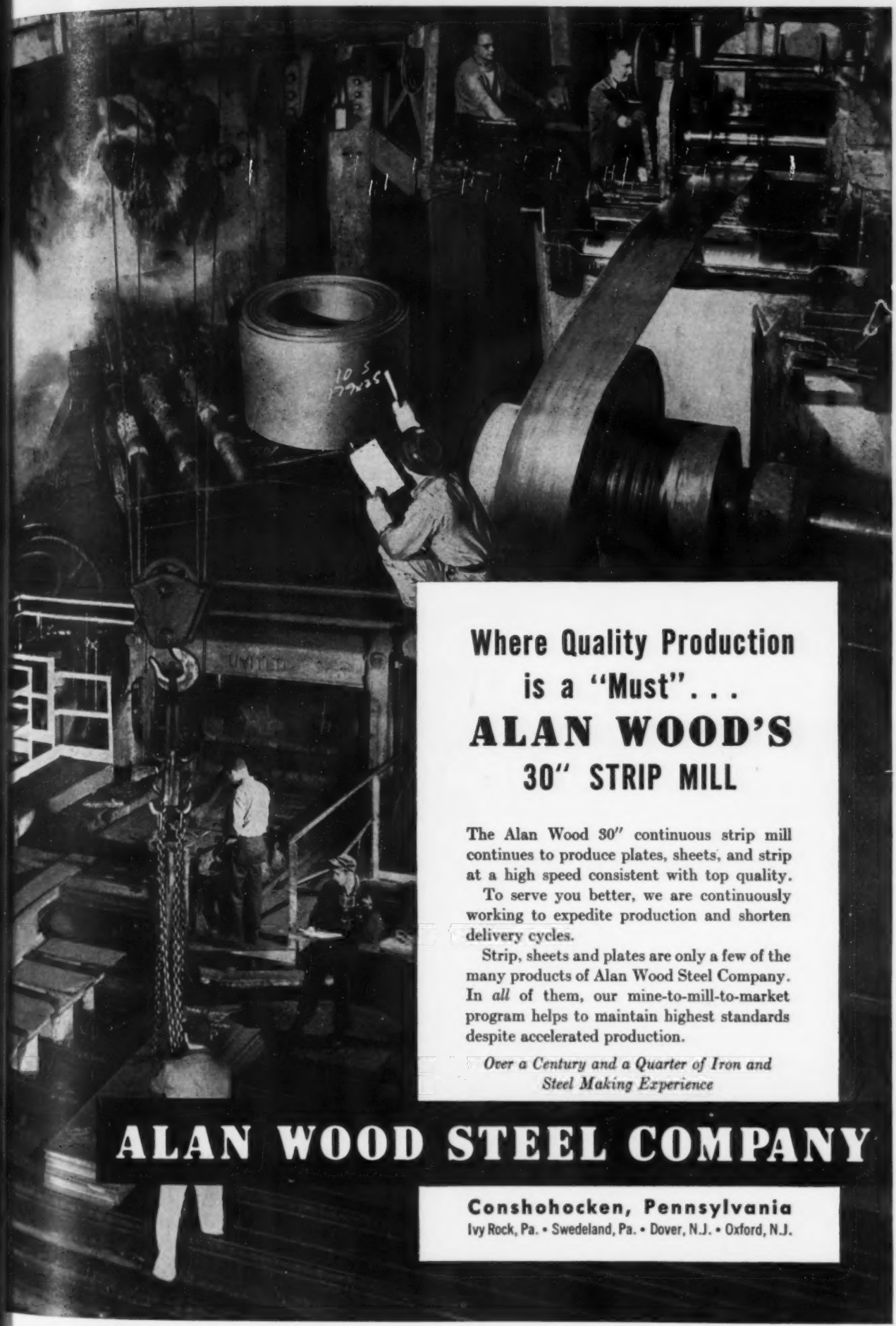
For more data circle No. 21 on postcard, p. 117.

Industrial X-ray unit fits into auto trunk

Portable industrial X-ray unit that fits into the trunk of an automobile is designed specifically for rapid inspection of welds, pipe lines, power plant, ship and aircraft equipment. The X-ray tube head also contains the high tension generator of 150,000 v output. It weighs 143 lb. The accompanying control is equally compact and weighs 80 lb. X-ray tube is fan-cooled and has an end port which provides maximum usefulness in handling various types of close-in work. Tube and generator unit has a diameter of 10⅝ in. x 35 in. long. Diameter can be reduced to 8½ in. by eliminating the removable guards. Power supply for the Philips MC 160 unit can be 115 or 230 v ac. Current drain is 20 amp. *North American Philips Co., Inc.*

For more data circle No. 22 on postcard, p. 117.

Turn Page



Where Quality Production is a "Must"...

ALAN WOOD'S

30" STRIP MILL

The Alan Wood 30" continuous strip mill continues to produce plates, sheets, and strip at a high speed consistent with top quality.

To serve you better, we are continuously working to expedite production and shorten delivery cycles.

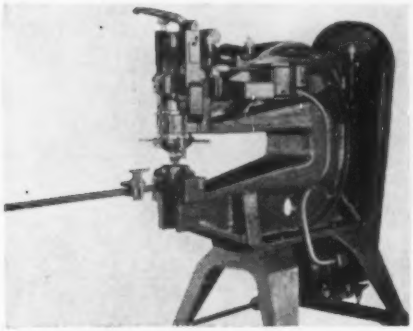
Strip, sheets and plates are only a few of the many products of Alan Wood Steel Company. In *all* of them, our mine-to-mill-to-market program helps to maintain highest standards despite accelerated production.

Over a Century and a Quarter of Iron and Steel Making Experience

ALAN WOOD STEEL COMPANY

Conshohocken, Pennsylvania

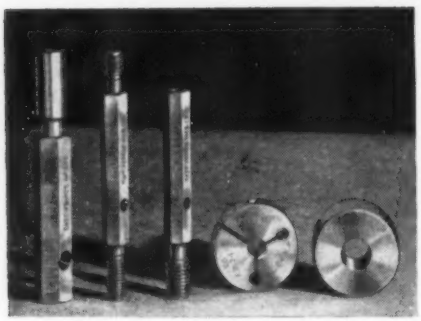
Ivy Rock, Pa. • Swedeland, Pa. • Dover, N.J. • Oxford, N.J.



Turret head nibbler has 3/8 in. capacity

Ease of operation is a major advantage of the Tabor-Gray turret head nibbler. Unskilled labor can run the nibbler easily because stock is fed freely and machine operation is simple yet positive. Finger-tip control permits instantaneous speed changes on a two-speed motor, and turret head feature permits turning of tool while cutting stock, instead of turning the stock. The nibblers cut shapes quickly and without distortion; will cut tough alloys up to ½ in. thick and milder alloys up to 1 in. Other features are long tool life and low initial investment. *Tabor Mfg. Co.*

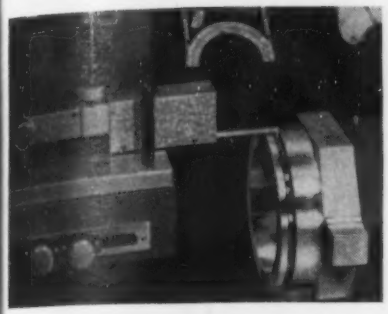
For more data circle No. 23 on postcard, p. 111.



Electrolized gages have durability, hardness

Tests have proved that electrolized gages have longer life due to the even film of hard, nonmagnetic alloy which is applied to all gaging surfaces during the electrolizing process. This coating is only 0.000025 in. thick, but it imparts a tough surface, resulting in long accurate gaging life before wear tolerance limits are reached. The surfaces are so smooth they reduce friction to a minimum, and possess a high degree of resistance to corrosion. They will not chip, peel, or spall under normal gaging conditions. Durability results in savings to users. *Taft-Pierce Mfg. Co.*

For more data circle No. 24 on postcard, p. 111.



Tracer measures surface roughness of grooves

Measuring surface roughness across the bottom of flat-bottomed grooves to ¼ in. depth and behind shoulders to ¼ in. height is possible with the Profilometer Type KB tracer. When measuring crosswise, it permits 1/16 in. length of trace in grooves of 5/32 in. width, and greater length of trace in wider grooves. The tracer can also be used in ID's from 25/64 in. to flat, and on all OD's and flats, where the part can be mounted on a Linear Pilotor with the work surface horizontal. The tracer is supported and moved mechanically by the Linear Pilotor. *Micrometrical Mfg. Co.*

For more data circle No. 25 on postcard, p. 117.

Turntables provide flexibility of material flow

Turntables for use with Sage rollers and gravity wheel conveyors permit products being conveyed on straight sections to be diverted at any angle, or to pass straight across these turntables. Roller or wheel conveyor sections are mounted on large, easy to rotate casters that turn these sections on a circular flat steel plate. Built-in lock arrangement rigidly holds the rotating section at the desired angle. Turntables are built for use with all widths of rollers, wheel arrangements, frames and couplings. *Sage Equipment Co.*

For more data circle No. 26 on postcard, p. 117.

Turn Page

—New Equipment—

Continued

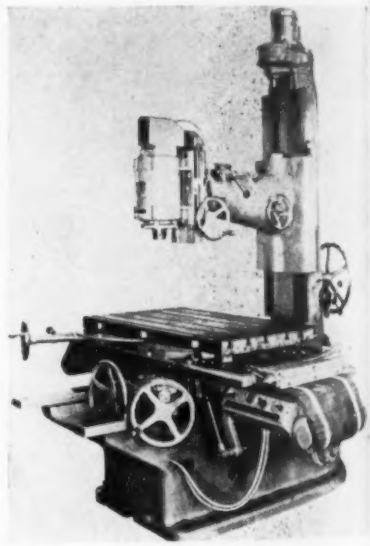
One-stage cleaner

Minit-Kote saves time and space in preparation of metal surfaces for painting. The one-stage phosphate cleaner removes in 60 sec, at a concentration of ¼ pct to 2 pct by volume, all traces of oil, dirt, rust and tarnish. At the same time Minit-Kote deposits a light, uniform phosphate coating on the surface that assures better paint adhesion. The cleaner is used in spray type washers at temperatures of 160 to 180°. *Klem Chemicals, Inc.*

For more data circle No. 27 on postcard, p. 117.

Milling machine

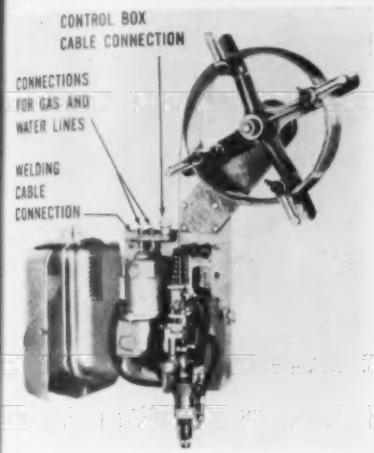
Patternmakers' milling machine, Bokoe Model 2, has an unusually large worktable and deep throat for machining many sizes and shapes of ferrous, nonferrous and wood workpieces. Manual controls on the worktable provide for 28-in. transverse and 48-in. longitudinal movement. With automatic feed, longitudinal movement is infinitely variable from 3 to 58 in. Transverse and rotary movement are also provided by automatic feed. Maximum diameter of turntable work is 8½ ft. Depth of throat between column slide and spindle center is 35 in. A wide range of settings and adjustments, and spindle speeds, are provided. Variable speed changer can be operated without stopping the machine. *Kurt Orban Co., Inc.*



For more data circle No. 28 on postcard, p. 117.

Arc voltage control

Lightweight sigma welding machine, the SWM-3, features arc voltage control, eliminating welding problems due to a fluctuating arc voltage. Electronic controls maintain the proper balance of welding conditions by instantaneously speeding up or slowing down weld-



ing wire feed rate as required by changing arc conditions. Smooth, uniform welds are made as a result of this precise control over welding variables. The electronic control unit does not have to be moved with the welding machine from one job to another; can be permanently mounted anywhere, as long as it is properly connected to the welding machine. The SWM-3 practically operates by itself. Operator presets the required voltage, throws the starting switch. *Linde Air Products Co.*

For more data circle No. 29 on postcard, p. 117.

Hydraulic control hose

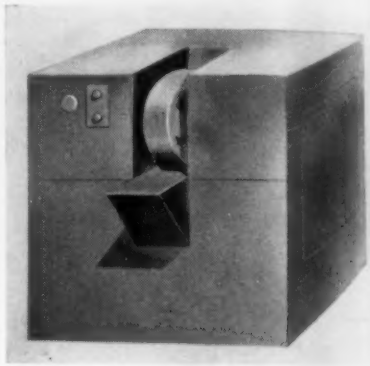
Capable of withstanding pressures to 5000 psi, Quaker's hydraulic hose is reinforced with fine, high tensile steel wire to give maximum flexibility and burst resistance under shock loads. This flexibility is retained at temperatures from −40° to +250°F. The rubber tube is compounded to resist all popular hydraulic fluids. Cross-wrapped rubber cover protects the carcass against weather, mildew, oils, greases, and fumes. Rubber impregnated cotton braid cover is also available. *Quaker Rubber Corp.*

For more data circle No. 30 on postcard, p. 117.

Turn Page

Induction die heaters

A new line of 60 cycle induction die heaters to preheat extrusion dies has been announced. With induction heating, a small or medium size die can be preheated in 4 to 10 min. The smallest unit in production is rated at 15 kw. This heater will handle dies for most standard

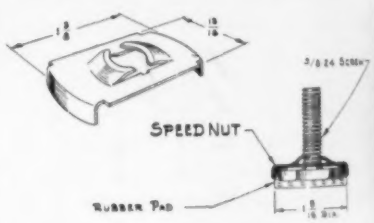


presses up through 1500 tons. It operates on either 220 or 440 v, 60-cycle. Electrical wires are the only connections necessary, and operation is automatic. An operator depresses a button and the heater goes to work instantly, heating the die to a predetermined temperature. *Magnethermic Corp.*

For more data circle No. 31 on postcard, p. 117.

Zip-on Speed Nut

Materials handling was cut in half and assembly operation speeded up with a zip-on Speed Nut designed to retain the rubber pads on leveling bolts of a popular automatic

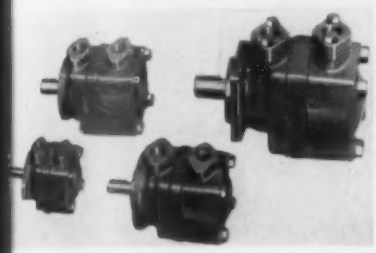


washer. This fastener is a heat-treated spring steel Speed-Nut for ⅜-24 in. bolt. Its ends are turned down to accommodate a 1 5/16 in. diam rubber pad. The zip nut can be applied to many products requiring leveling devices. *Tinnerman Products, Inc.*

For more data circle No. 32 on postcard, p. 117.

Hydraulic motors

Two new sizes of vane motors complete the range from 5 to 28.5 hp. They furnish rugged and dependable sources of hydraulic rotary power for all types of mobile and industrial machinery applications. The motors incorporate the Vickers design features of automatic pres-



sure loading, automatic adjustment of radial and axial clearances, maintenance of a lubricating oil film on both rotor faces and vanes, and rugged but compact and lightweight construction. Long life and high efficiency with low maintenance requirements are assured by use of the best heat treated alloy steels and by the "rocking beam" construction. *Vickers, Inc.*

For more data circle No. 33 on postcard, p. 117.

Open end hopper box

Quick and safe handling of materials during shop production operations is insured by hopper opening stacking box design. Opening feature and stacking arrangement

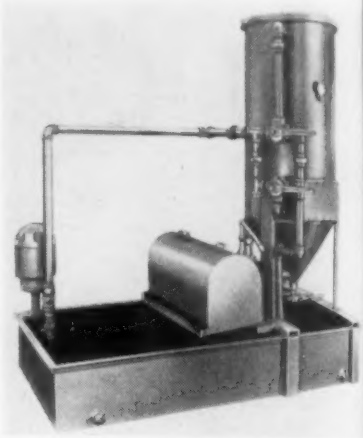
allow easy access to the material in all boxes while stacked one on top of another. Eight standard sizes are available; in choice of 16 and 18 gage sheet metal. *Platt & Labonia Co.*

For more data circle No. 34 on postcard, p. 117.

Turn Page

Coolant clarifier

Greater filtering capacity plus low operating cost is offered with the Houdaille J type coolant clarifier. Compact, multiple filter-tube unit features over 16,000 sq in. of filtering area; removes chips, abrasives, dirt and other solid contaminants from both water based and mineral



oil coolants used in individual machine tools or small central systems. Clarification is accomplished by passing coolant through multiple filtering tubes suspended vertically within the clarifier. Self-cleaning tubes, washed free of contaminants during backwash period, require no manual cleaning or maintenance. *Honan Crane Corp.*

For more data circle No. 35 on postcard, p. 117.

Weld-backing paste

Silicone "bouncing putty" has been found to improve welds in steel plates and pipe. The silicone material which can be pulled like taffy, broken with a quick snap, or bounced like a ball, is being thinned to a fluid paste and marketed as a weld-backing compound. Painted on joints before welding, the product promotes uniform weld penetration and eliminates harmful effects of air on the underside of welds. It is suggested for use in all arc welding processes except automatic inert-arc welding where argon is used as the shielding gas. One 16-oz can of the paste covers 1300 lineal feet of joint when applied in a strip ½ in. wide. *General Electric Co.*

For more data circle No. 36 on postcard, p. 117.

The Iron Age

SALUTES

Roy Fruehauf

His boundless energy and wide experience have contributed greatly to the growth of the firm he heads.

ONE of these days husky Roy Fruehauf is going to write a book called *How to Live On 28 Hours A Day*. He's had a lot of practical experience in cramming 4 extra hours into every day.

Roy, president of Fruehauf Trailer Co., has almost boundless energy, keeps in constant touch with his company's six manufacturing plants by plane. The *Detroit Free Press* recently commented, "Roy Fruehauf trails no one in drive."

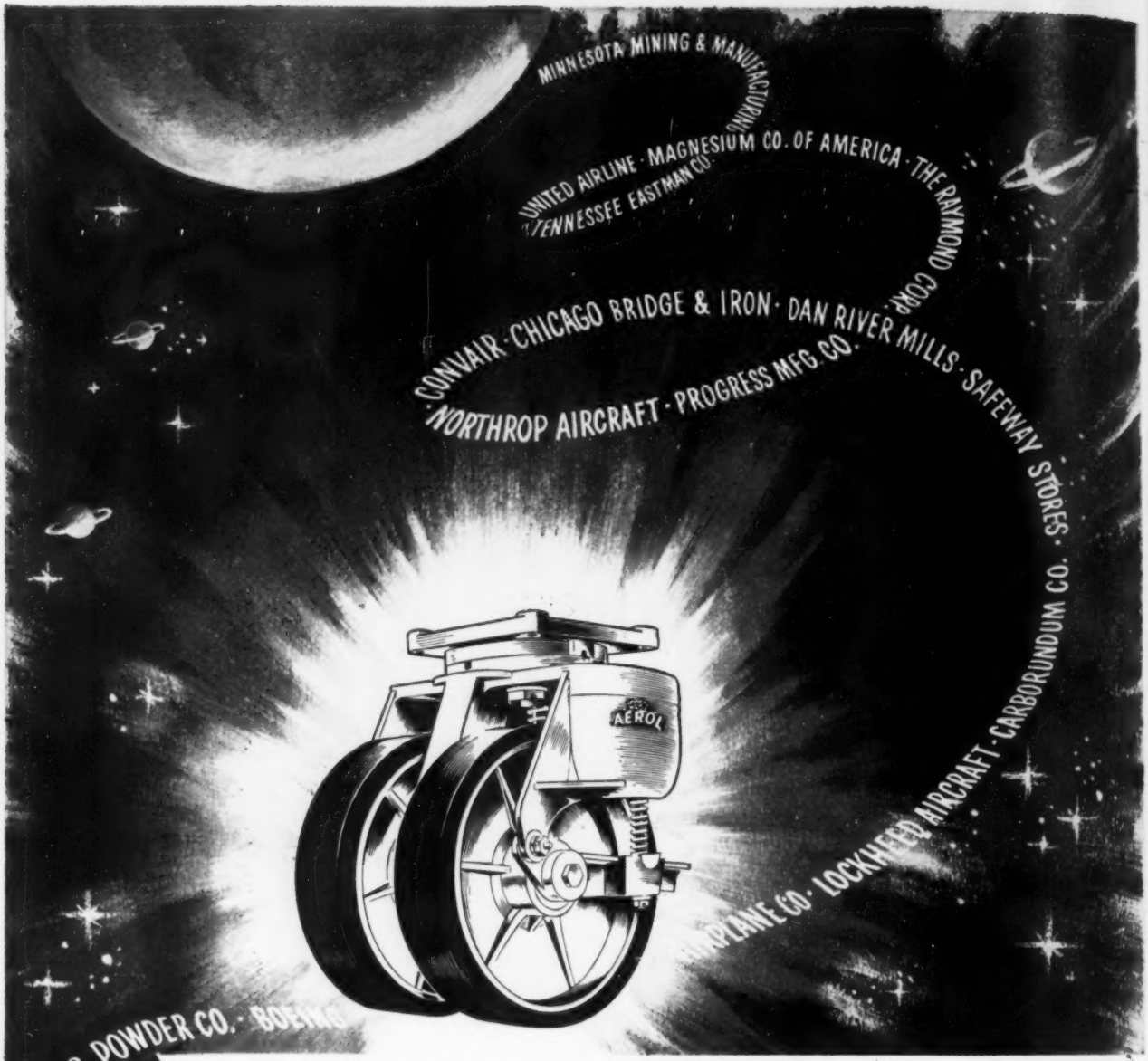
Roy was born at Fraser, Mich., the youngest of four sons of August C. Fruehauf, whose Detroit wagon blacksmith shop was the start of one of the country's largest truck-trailer manufacturing firms.

After school and college in St. Louis, Roy went to work in 1928 in the family business, now firmly established by his older brother. In the next 12 years he moved through a succession of jobs covering all phases of the truck-trailer business.

In 1938 he was vice-president—sales, in 1940 vice-president in charge of operations. Made executive v-p in 1944, he moved into the presidency in May of 1949.

Roy finds his job no longer leaves him time for his favorite sport of power-boating—the 180 mile per hr kind. He does manage to work in some riding and bowling, wishes he could take up golf again—"just to become an average golfer."

But one close associate points out that Roy will never be happy as an average golfer, "he does everything else too well."



The Iron Age

INTRODUCES

Donald M. Laflin, named vice-president in charge of sales, GIDDINGS & LEWIS MACHINE TOOL CO., Fond du Lac, Wisconsin; **Edgar L. McFerren,** appointed vice-president in charge of engineering; **Milton H. Nichols,** made export sales manager; and **David F. Robinson,** becomes Northeastern district sales engineer.

Frank G. Fisher, vice-president and general manager, elected a director, HOUDAILLE-HERSHEY CORP., Detroit.

G. W. Bulmer, appointed vice-president in charge of sales, NORTHWESTERN STEEL & WIRE CO., Sterling, Ill.

Dr. H. N. Stephens, elected vice-president in charge of central research, MINNESOTA MINING & MFG. CO., St. Paul, Minn.

Roy Abernethy, appointed vice-president and general sales manager, KAISER-FRAZER SALES CORP., Willow Run, Mich.

George W. Drysdale, named vice-president and assistant to the president, BRIGGS MFG. CO.; **Joseph D. Quinn,** appointed vice-president in charge of manufacturing; and **Fred W. Hofmann,** promoted to executive vice-president.

Harald T. Reishus, elected vice-president in charge of Industrial Power Div., INTERNATIONAL HARVESTER CO., Chicago; and **Eugene F. Schneider,** elected vice-president, in charge of Farm Implement Div.

George R. Kinney, appointed executive assistant, J. L. OSGOOD MACHINERY & TOOL CO., Buffalo.

Dr. J. Edward Lynn, appointed director of Basic Research, NATIONAL GYPSUM CO., Buffalo.

Ivan L. Coulter, appointed comptroller and assistant treasurer, SCOVILL MFG. CO., Waterbury, Conn.

Howard A. Baldwin, appointed director, Power Section, GENERAL MOTORS CORP., Detroit.

Martin B. Westerman, appointed assistant director of labor relations, KAISER STEEL CORP., Fontana, Calif.

William J. Farrissee, appointed associate dean and professor of civil engineering, STEVENS INSTITUTE OF TECHNOLOGY, Hoboken, N. J.

Wolford M. Ewalt, made special products supervisor, Niagara sales office, HOOKER ELECTROCHEMICAL CO.

E. C. Warrick, promoted to chief engineer, Power Tool Engineering Div., ROCKWELL MFG. CO., Pittsburgh.

Frank J. Donahue, appointed supervisor of training placement. ALLIS-CHALMERS MFG. CO., Milwaukee.

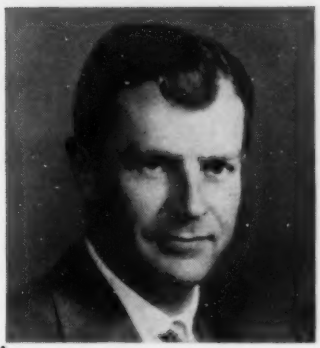
F. W. Leslie, appointed manager, Montreal Div., A. C. LESLIE & CO., LTD.; **F. A. Cramp,** appointed director of purchasing; **H. Johnson,** becomes sales manager—Steel; and **A. R. Smith,** appointed sales manager—Metals.

T. E. Donohue, promoted to sales manager, Cleco Pneumatic Tool Div., REED ROLLER BIT CO., Houston, Tex.

John H. Durant, appointed business manager, Research Div., NATIONAL RESEARCH CORP., Cambridge, Mass.

Humbert C. Cozza, Jr., appointed manager, industrial engineering, The Lewis Machinery Div., BLAW-KNOX CO., Pittsburgh.

W. R. Dunn, appointed divisional controller, Western Div., THE COLORADO FUEL & IRON CORP., Pueblo, Colo.; and **C. M. Ahearn,** appointed divisional controller, Eastern Div.



ROBERT F. SMITH, elected president, The Indiana Steel Products Co., Valparaiso, Ind.

WALTER A. STERLING, elected president and a member of the board of directors, The Cleveland-Cliffs Iron Co.

T. A. STRAUB, JR., elected vice-president, Fort Pitt Bridge Works, Pittsburgh.

O. F. Marsal, becomes plant manager, LINCOLN - MERCURY DIV., General Motors Corp., Los Angeles, and **H. H. Keays**, becomes plant manager, Wayne, Mich.

Bruce H. Atwater, appointed sales manager, INET, INC., Los Angeles.

George R. Winter, elected a director, HANSELL-ELCOCK CO.

W. D. Willes, appointed general manager, Nordstrom Valve Div., Oakland Plant, ROCKWELL MFG. CO.

Charles W. Kennedy, appointed assistant district sales manager, Houston, Tex., sales office, REPUBLIC STEEL CORP.

K. C. Dillman, appointed traffic manager, A. P. GREEN FIRE BRICK CO., Mexico, Mo.

Warren A. Blossom, appointed service manager, ST. PAUL HYDRAULIC HOIST, Minneapolis, Minn.

Erhardt C. Koerper, appointed works manager, AMPCO METAL, INC., Milwaukee.

William C. Behmer, promoted to district sales manager, Chicago, GRAVER TANK & MFG. CO., East Chicago, Ind.

John C. McDevitt, appointed regional manager, ADMIRAL CORP., Kansas City area. He replaces **Charles F. Gill**, who has been named regional manager, Washington, D. C. **Elmer B. Freeman**, named New England regional manager.

Roy W. Sidbury, appointed district manager, Baltimore, Maryland branch, CHASE BRASS & COPPER CO., INC., a subsidiary of Kennecott Copper Corp.

Thomas C. Tiearney, promoted to sales engineering staff, HONAN - CRANE CORP.

Louis H. Niebling, made manager, Chicago district sales office, MID - WEST PIPING CO.

A. A. Throckmorton, appointed alloys division manager in charge of sales for primary pig, ingot and billet products and special foundry ingot, KAISER ALUMINUM & CHEMICAL SALES, INC.

R. PAUL TOEPPEN, elected vice-president, James H. Knapp Co., Los Angeles.

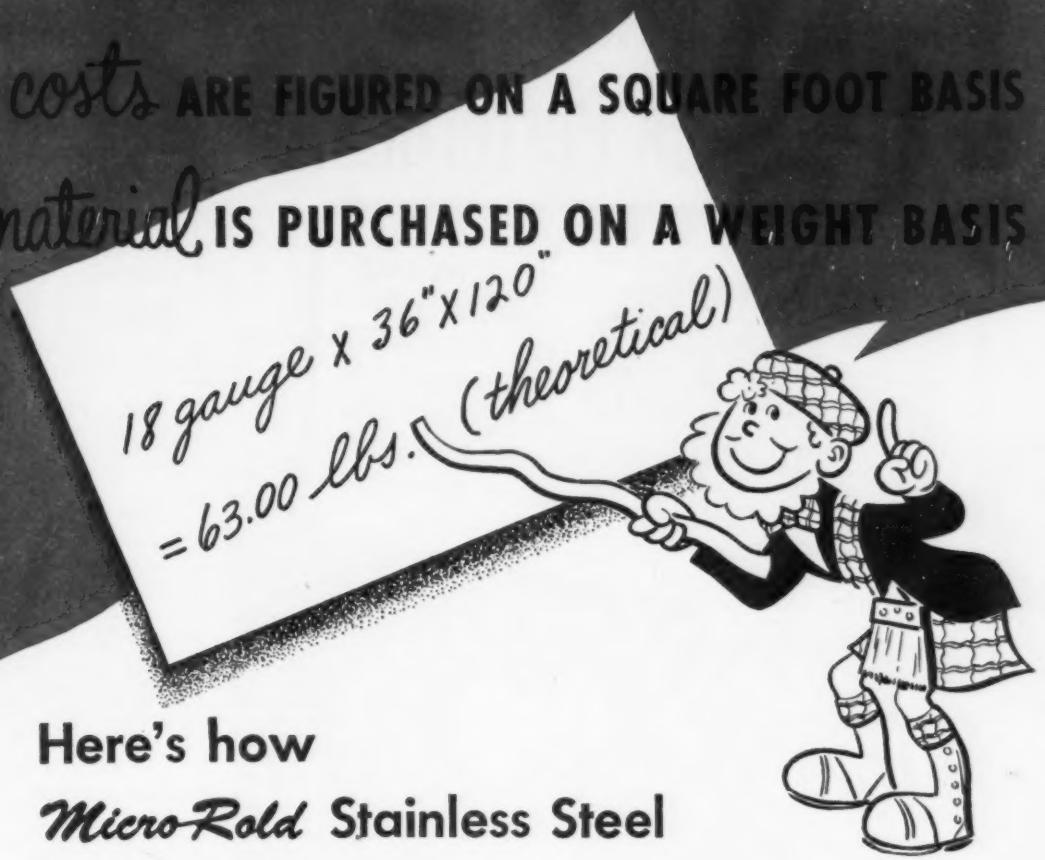
THOMAS T. KLING, elected vice-president and director, The Lodge & Shipley Co., Cincinnati.

NELSON GAMMANS, elected secretary, Barium Steel Corp., New York.

SHERMAN W. RICHARDSON, appointed industrial relations manager, Oliver Iron & Steel Corp.

Job costs ARE FIGURED ON A SQUARE FOOT BASIS

WHILE material IS PURCHASED ON A WEIGHT BASIS



Here's how *MicroRold* Stainless Steel SAVES you money

In the use of stainless steel, the selection of gauge number is usually determined by the minimum permissible thickness having sufficient strength to meet the requirements of the application. When you receive material on the heavy side of the gauge you are paying a premium for stainless surface area.

When sheets are ordered by gauge number, the permissible A. I. S. I. variation in thickness is plus or minus 10%. Thus, if you order 18 gauge, you may receive sheets .052" thick, when a thickness of .0475" would suit your purpose. Using a standard 18 gauge 36" x 120" sheet as an example, the theoretical weight is 63.00 pounds, but this weight could permissibly vary between 59.22 pounds and 65.52 pounds. Each .001" of thickness adds 1.26 pounds per sheet.

MicroRold sheets may be ordered by gauge number and you can specify they be rolled on the light side of the gauge range. This is true because the equipment is such that more accurate control of thickness is possible.

If you are not a user of MicroRold sheet it will pay you to get the full details. Your steel warehouse distributor will gladly tell you the MicroRold story.

Washington Steel

CORPORATION

WASHINGTON, PENNSYLVANIA

Personnel

Continued

James W. Ramsey, appointed assistant general traffic manager, AMERICAN STEEL & WIRE DIV., of U. S. Steel Corp.

Clarke Tryon, appointed sales manager, RAMSET FASTENERS, INC., a division of Olin Industries, Inc., East Alton, Ill.

James A. Lawson, appointed eastern zone manager, PLYMOUTH MOTOR CORP., Detroit.

John C. Spencer, has joined the general advertising staff, Pittsburgh ALUMINUM CO. OF AMERICA.

Edwin S. Hanny, appointed field representative, Connecticut and Western Massachusetts, ALLOY PRECISION CASTINGS CO., Cleveland.

George S. Ford, appointed traveling freight agent, Boston, Mass., WABASH RAILROAD CO., succeeding J. B. Darlington, Jr., who has resigned.

Edward W. Forth, named assistant plant superintendent, DEWALT, INC., subsidiary of American Machine & Foundry Co., Lancaster, Pa.

Carl T. Dowling, named New Jersey representative, BART-MESSING CORP., Belleville, N. J.

L. J. Marrell, appointed field representative, Mid-West, ALLOY RODS CO.; and **J. E. Fitzgerald,** becomes field representative, Southern territory.

OBITUARIES

James W. McLaughlin, 62, vice-president, Union Carbide & Carbon Corp., New Rochelle, N. Y., suddenly at his home.

Thomas O. Richards, 53, head of the Executive Engineering Dept., Research Laboratories Div. of General Motors, after a short illness. He had been with the Research Laboratories since 1925 and headed the laboratory control dept. until taking over his position this year.

Edward C. Badeau, 58, in charge of the Special Publications Section, The International Nickel Co., Inc., and editor of *Inco Magazine,* suddenly, from a heart attack at the Staten Island Hospital.

Otto L. Miller, 61, Detroit district manager, Steel & Tube Div., Republic Steel Corp., recently.

The Iron Age
FOUNDED 1855
Technical Articles

A nice case—

High Output of QUALITY GEARS Requires Tailor-made Shop

By H. J. Bates
Supt., Metallurgy and Inspection
Fairfield Mfg. Co.
Fairfield, Ind.

◆ Mass production of top quality automotive gears requires close liaison between design, heat treating and production departments . . . Fairfield Mfg. Co. had this in mind when it set up its new plant.

◆ Fairfield makes nearly 3000 different gears and related parts . . . Production—in better than 70 different steels and alloy grades—ran to over 1 million lb last year . . . Smooth work flow, close quality control are built into the heat treating operations.

◆ Annealing, normalizing, carburizing, clean hardening are major operations . . . Quench oil and carburizing compound are handled by central distribution systems. Automatic controls, press-quenching arrangements, integral washing, and testing operations are other high points in the Fairfield setup.

◆ QUALITY GEAR PRODUCTION depends on close contact between design, production and heat treating departments. In planning its new plant at Lafayette, Ind., Fairfield Mfg. Co. considered close liaison between its three departments a basic factor.

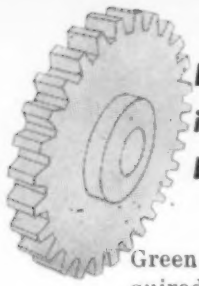
The modern 184,000 sq ft plant is efficient and tailor-made for volume joblot production of automotive power transmission gears. The plant layout is based on 30 years of heat treating plant operation. Over 24 pct of productive floor space is devoted to heat treating facilities.

Heat treat processing must fit into this production picture on an economical basis. Although production is job-lot, overall volume is large. This high level of output must be maintained with a low reject rate to produce quality gears at a low price.

Equipment and processes provide for gas and pack carburizing, controlled atmosphere and direct-fired hardening, cycle annealing, normalizing, drawing and tempering.

Differential and transmission gears and other large and small gears for all types of vehicles—tractors, trucks, locomotives, diesel engines—are produced. In a year, 2500 to 3000 different gears and related parts weighing over 1 million lb are heat treated. Over 73 types of steels are processed.

The heat treat department is laid out for efficient work movement and handling. Work flow through the plant, Fig. 1, is integrated.



Heat treat department is divided into annealing - normalizing, carburizing and hardening areas . . .

Green forgings, annealed or normalized as required, follow this general flow pattern and return for heat treating before grinding and inspection. The Table shows sequence of production and heat treat operations for typical gears.

To facilitate production and centralize equipment and operations, the heat treat department, Fig. 2, is divided into annealing-normalizing, carburizing and hardening areas. Annealing-normalizing operations are carried out primarily in two continuous, pusher-type furnaces and six batch-type oven furnaces. All burn high pressure natural gas at 25 psi.

Largest of the pusher furnaces is a two-row combination cycle-annealer and normalizer, Fig. 3, built by Surface Combustion Corp. Although designed for two distinct cycles, the furnace can carry out straight normalizing operations with only minor adjustments in operation sequence and burner-equipment control. The primary cycles are:

Cycle 1—Heat and hold at 1750°F.
Cool to 1300°F in 20 to 30 min.
Slow cool to 600°F.

Cycle 2—Heat and hold at 1750°F.
Cool to 1100°F in 2 to 3 hr.
Cool to 600°F in furnace.

This 57-ft furnace has five individually controlled zones for heating, soaking, superfast cooling, fast cooling and slow cooling in any combination. The super fast cooling zone, isolated by movable doors, can be eliminated by moving trays rapidly through this zone. Trays, 40 x 18 in., are used in single or double arrangements to handle up to 1200 lb of work per hr. Direct-firing automatic-proportioning tunnel burners operate on natural gas at 25 psi line pressure and 4300 cu ft per hr.

The other pusher-type, single-row controlled-atmosphere normalizer, manufactured by Electric Furnace Co., handles small forgings and low-alloy carburizing grade steels. This furnace utilizes a side discharge onto an air quench conveyor.

The batch-type horizontal-hearth Surface Combustion furnaces are reserved for overflow work and for small lots requiring special cycles. Carburizing operations use controlled atmosphere and the pack processes in existing equipment without sacrificing quality or speed.

Gears requiring close control of case depth and surface carbon are carburized in a Surface Combustion 2-row pusher-type controlled atmosphere furnace, Fig. 4. This radiant tube furnace is rated at 400 lb of work per hr using three controlled zones of heating: (1) 1700°F, (2) 1700°F, (3) 1550°F. Treatment is designed to produce a 0.050-in. case at a 0.40 pct C depth with a surface carbon of from 0.90 to 1.10 pct. There is sufficient flexibility to provide an 0.80 pct surface carbon on boron steels.

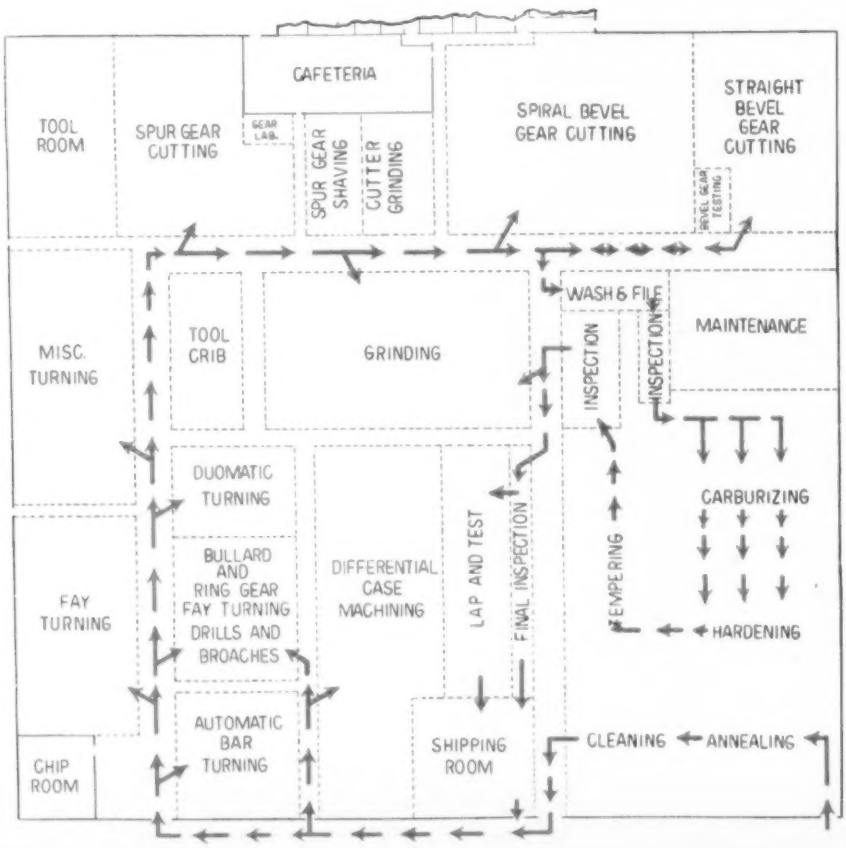


FIG. 1—Schematic diagram showing basic flow of work through all departments, including heat treating. Fairfield's new plant is laid out for close contact between design, production and heat treating departments. Raw material enters at lower right and goes through annealing and cleaning operations before moving into machining departments. Machined parts return for further heat treating.

TABLE

SEQUENCE OF OPERATIONS
On Four Types of Gears

Differential Side Gear	Spiral Pinion Gear	Helical Gear	Bull Gear
SAE 4320	SAE 4320	SAE 4140	SAE 4820
1. Cycle Anneal (1750—1100 600—300°F)	1. Cycle Anneal (1750—1100 600—300°F)	1. Anneal (1000°F—2 hr batch fces.)	1. Cycle Anneal (1750—1100 600—300°F)
2. Blast clean	2. Blast clean	2. Blast clean	2. Blast clean
3. Drill hole	3. Turn	3. Face	3. Face
4. Broach	4. Face	4. Bore hole	4. Turn outside diameter
5. Turn	5. Drill	5. Turn	5. Face
6. Chamfer	6. Cut threads	6. Drill holes	6. Grind
7. File	7. Hob	7. Lap	7. Hob teeth
8. Rough teeth	8. Grind	8. Inspect	8. Finish teeth
9. Finish teeth	9. Cut teeth	9. Harden (Atmosphere 1550°F—75 min Press quench)	9. Cut teeth
10. Drill holes	10. File and stamp	10. Clean	10. File teeth
11. Burr teeth	11. Inspect	11. Draw (1025°F—1.5 hr Bhn 302-341)	11. Inspect
12. Stamp	12. Copper plate end and threads	12. Inspect	12. Carburize (Pack in box 1700°F—Case 0.060-0.075 in.)
13. Inspect	13. Carburize (Atmosphere 1700°F—80 min Case—0.060-0.080 in. Quench in oil)	13. Hob teeth	13. Anneal (1200°F—2 hr)
14. Carburize (Pack—1700°F Case—0.040-0.050 in. Cool in box)	14. Degrease	14. Chamfer	14. Grind
15. Harden (Atmosphere 1500°F—50 min Plug quench in oil 110°F)	15. Draw (Partial threads in lead—1200°F)	15. Shave teeth	15. Turn
16. Degrease	16. Draw (All over 325°F—2 hr Shore 75-85 File hard)	16. File and stamp	16. Shave teeth
17. Draw (325°F—1 hr Rc 60 File hard)	17. Clean	17. Inspect	17. Harden (Atmosphere 1500°F—2 hr Quench press)
18. Inspect	18. Straighten		18. Clean
19. Grind	19. Inspect		19. Draw (375°F—2 hr Rc 55-62)
20. Inspect	20. Grind		20. Clean
	21. Inspect		21. Inspect
			22. Grind
			23. Inspect
Rough weight 11.25 lb	41.0 lb	108 lb	194 lb
Finish weight 8.0 lb	28.9 lb	95 lb	120 lb

Suction-type radiant tubes are located above and below the work. Fans in the furnace roof circulate the heated atmosphere gases. Work can be discharged directly to quenching presses through a flame-curtained slot door. Work trays can be automatically side-discharged from the third zone directly into a hooded oil quench while still in contact with the furnace atmosphere. Carburizing atmosphere is furnished by centrally located endothermic- type RX generators.

Precise scheduling essential

Job-lot carburizing is practical in this continuous controlled atmosphere furnace if overall production rates are high enough. Flexibility within each row and between rows while work is being pushed through, permits practically simultaneous gas carburizing of single large scale runs and small lots. Precise scheduling is essential since time is the key to case depth.

Since movement of each row of work is individually controlled, two work-cycles can be handled at once. A 50-min push time or a 9-hr 10-min cycle will yield an 0.039-in. case; while a 75-min push time or 13-hr 45-min cycle will result in a case depth of 0.072 in. on the same 0.20 pct C carburizing steel.

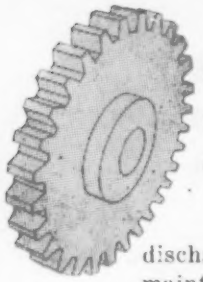
Eleven trays 22 in. square are loaded in each row with three trays in the first zone, seven in the second and two in the third. To change from one cycle to another in the same row, parts requiring the same case depth are loaded together and charged in succession. For example, if three trays of parts require a certain case depth and the next eight trays, as loaded, require a deeper case, the latter would be pushed into the furnace at the higher speed until the furnace is full. The first three trays will be discharged at the lower speed.

Variety in parts and steels

A number of different steel analyses and a variety of part sizes and shapes can thus be accommodated in a single row at one time. The operator can press quench or direct quench the trays in this row in any sequence desired. A typical charge, Fig. 4, is being readied for entry into the purge vestibule for the push into zone No. 1. Various fixtures are used for pinions and for large and small ring gears. Pinions will be direct, oil-quenched in the hooded tank. Ring gears will be press-quenched.

This type furnace may be idled over a weekend without removing the work. Work is held at a reduced temperature under carburizing atmosphere. This suspended carburization is provided for in the RX generator manifolding.

After removal from the oil quench, gears are cleaned in a 2-station washer adjacent to the gas carburizer. Furnace, quench tank and washer cover an area 23x42 ft. Hydraulic controls are centralized on compact panels at charge and



By varying push speeds as many as five time cycles are handled on one track in 12 hr. . . .

discharge ends to minimize piping and simplify maintenance.

Pack carburizing operations are carried out in two continuous, single-row direct-fired pusher furnaces and seven batch-type oven or box furnaces. Pack furnaces provide flexibility in carburizing production by handling gears that do not require as close control of case depth. They also handle short runs of large pieces that cannot be accommodated in the controlled atmosphere gas carburizer.

Each pusher furnace is about 33 ft long, including charge table and run-out conveyor for hand discharging the carburizing boxes. These containers of heat-resisting alloy sheet, are 21 in. deep and 14, 17 and 20 in. in diam. From 9 to 13 boxes can be accommodated in each row on cast alloy trays.

By varying push speed in each row, as many as five cycles have been handled on one track in 12 hr. Cycles may vary from 48 min to 2.25 hr. Using an 0.20 pct carbon carburizing steel, small gears (13 boxes per row) can achieve an 0.040-in. case in 10 hr 24 min with the 48-min push time. Large gears (9 boxes per row) can develop an 0.080-in. case in 20 hr 15 min with the 2.25-hr push time.

Both furnaces have two heating zones each

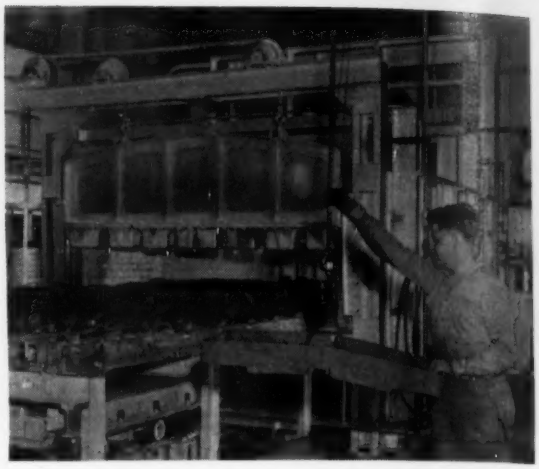


FIG. 3—Charging end of the direct-fired, cycle annealer and normalizer. Gears are loaded in double trays.

held at 1700°F. Rated capacities are about 625 lb per hr gross per furnace. The operator, Fig. 5, is manually discharging one of these pusher furnaces. In the foreground is a gas-fired furnace for box loads requiring press-quenching. The hood for one of the spent carburizing-compound recovery points in the handling system can be seen between the furnaces.

Batch oven furnaces, tied into the carburizing-compound handling system, are used for work that does not require a press or plug-quench. Case depths obained in the batch furnaces vary between 0.020 and 0.080 in. and furnace temperatures from 1650° to 1700°F. In a typical cycle, charge is brought up to 1450°F

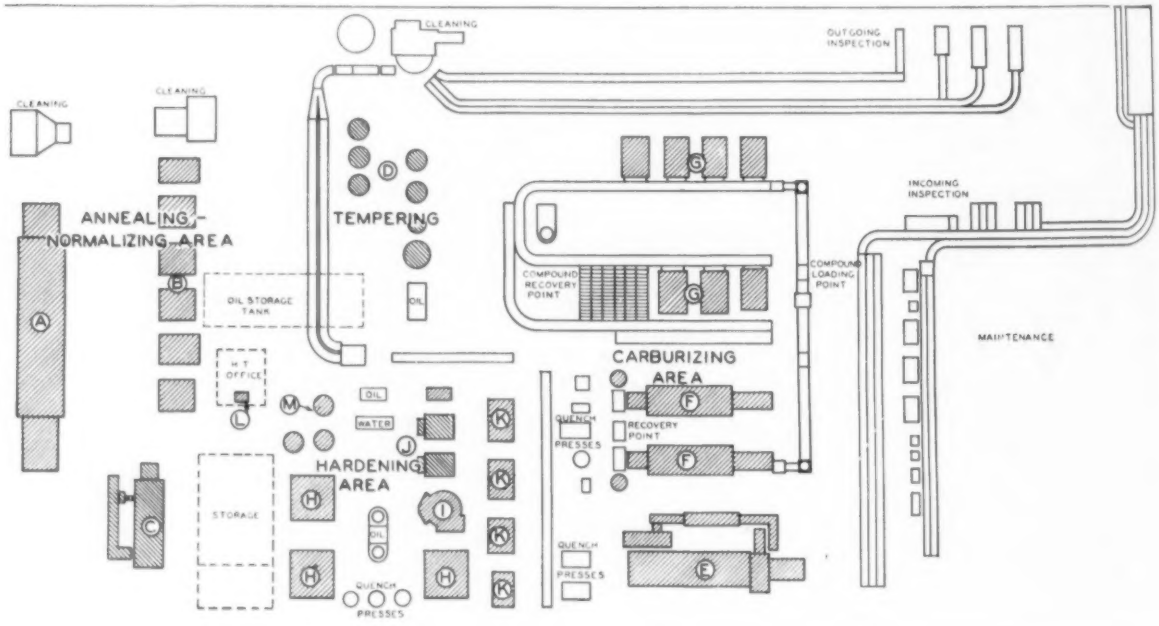


FIG. 2—Equipment in the heat treating department includes: A, pusher-type cycle annealer; B, batch-type oven annealers; C, pusher-type normalizer; D, pit-type annealing and hardening furnaces; E, pusher carburizer and washer; F, pusher-type direct-fired pack carburizers; G, batch, pack carburizers; H, rotary hearth clean hardening furnace; I, direct-fired rotary hardener; J, batch hardening furnace; K, RX atmosphere generators; L, 6-station dew point recorders. Plant was laid out with eye on simplified handling of materials.

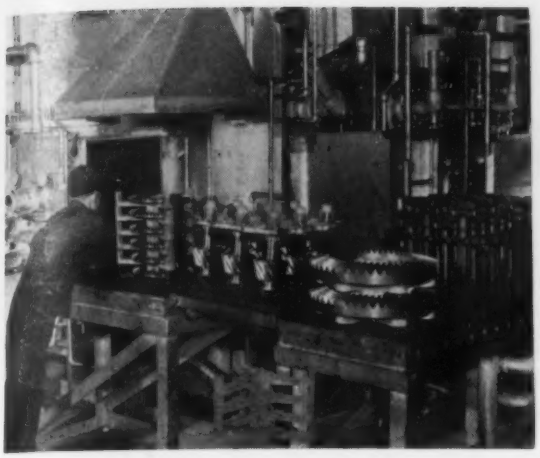


FIG. 4—Charging end of controlled-atmosphere, pusher-type carburizer. Note various types of gears in charge. Special gear racks have been developed.

FIG. 5—Discharge end of direct-fired, pusher pack carburizers. Holding furnace in foreground is for box loads requiring press quenching.

soaked for 2 hr and then brought to carburizing temperature and held for prescribed time to achieve desired case depth. Work boxes vary from 12 to 30 in. in diam and from 18 to 24 in. in height. To facilitate sliding along the furnace hearth, boxes are inverted just prior to charging. Carburizing facilities are completed with a 25x36-in. Leeds & Northrup Homocarb furnace for gas-carburizing in lots up to 1000 lb.

The hardening area includes four Surface Combustion continuous rotary-hearth furnaces, three of the controlled atmosphere type, the fourth direct-fired. In addition, there are two small batch-type direct-fired furnaces.

Gears previously gas or pack-carburized are clean-hardened in these furnaces. Plug quenching in an agitated quench tank, or machine quenching in a battery of four presses follows. To facilitate quenching, rotary furnaces, Fig. 6, are arranged in two rows with doors facing each other and the quench tank and presses.

Gears and shafts made from medium carbon alloy and plain carbon steels are also hardened at temperatures ranging from 1380° to 1600°F and cycles from 30 min to 2.5 hr. Gears and shafts carburized in the atmosphere rotaries must be file hard. Hardness of medium carbon parts must be RC 50 minimum at ¾ radius. Carburized alloy parts must be over RC 60 in the as-quenched condition.

The direct-fired rotary hearth, rated at about 210 lb of work per hour, is used for hardening differential spiders on which minimum surface scale is not detrimental. Direct-fired batch furnaces harden differential case forgings of SAE 1043 steel.

Two 22-in. diam x 26-in. and three 28-in. diam x 28-in. Leeds & Northrup Homo-tempering furnaces are located between the hardening area and an American Wheelabrator Tablast. Tempering and hardening equipment is serviced by a bridge crane. The Tablast cleans gears and shafts.

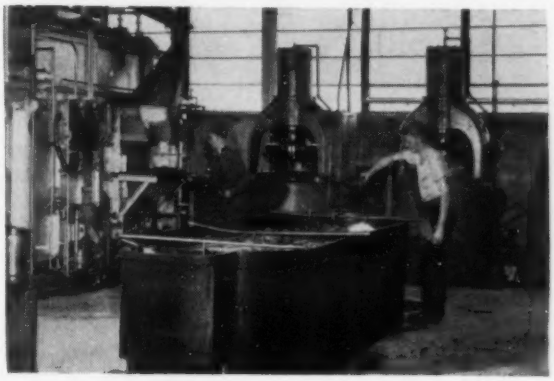


FIG. 6—Hardening area, showing rotary hearth furnace and quench tanks and presses, center.

Prepared atmosphere gas for carburizing and clean hardening is generated by four manifolded-Surface Combustion RX endothermics. These 2400-cu ft per hr generators crack a noncombustible mixture of natural gas and air in the presence of a catalyst at high temperature. The product, approximately 20 pct CO, 40 pct H_2 and 40 pct N_2 is chilled and piped to the point of use. For carburizing, this carrier gas is enriched with natural gas. One generator is for standby use. Carrier gas analysis is controlled by adjustment of an orifice plate in each air-gas mixer.

Quench oil and pack carburizing compound are centrally stored and conveyed to point of use as required. A 20,000-gal tank for quench oil is located under the floor. Four 225-gpm pumps feed filtered oil to nine quench presses and five recirculated quench tanks. The controlled-atmosphere quench tank on the gas carburizer can also be tied into this system. After use, the straight mineral oil flows by gravity to a sump where it is pumped through three stands of cooling coils before discharging into the main storage tank.

Thoriated tungsten electrodes pay—

3 Ways to Boost

By H. A. Huff, Jr.
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New York

◆ Three factors—a change in shielding gas, adaptation of a machine for two-torch operation, and use of thoriated tungsten electrodes—tripled the production rate of aluminum case boxes . . . Use of helium and direct current with the inert-gas-shielded tungsten arc process produces a hotter arc than argon and alternating current.

◆ Thoriated tungsten electrodes, used instead of pure tungsten electrodes, have higher current-carrying capacity and reduce electrode contamination . . . Presence of thorium oxide on the electrode surface greatly increases electron emission.

◆ ALUMINUM CASE BOXES have been machine welded by the inert-gas-shielded tungsten arc (Heliwelding) process at the Gray Mfg. Co., Hartford, Conn. Welding is still being done by the same process, but three important factors have helped to triple production. These are: (1) the shielding gas used, (2) adaptation of equipment for unique two-torch operation, and (3) use of thoriated tungsten electrodes.

Selection of the proper shielding gas is extremely important if welds of high quality are to be made at high welding speeds. Superiority of either gas—argon or helium, or a mixture of both—depends on a number of job factors such as the type of operation, the material used, thickness of material to be welded, desired weld quality and contour, joint design and others.

When welding aluminum by machine or in a fully-automatic installation, use of helium and d.c. triples the welding speed obtainable with argon and a.c. In contrast to the 9 to 10-ipm speeds on 0.064 and 0.090-in. thick 52S aluminum using argon and a.c., the Gray Mfg. Co. is now welding at 30 to 32 ipm, using helium and d.c. Welding speeds in other applications are as high as 240 ipm. Argon is preferred for manual welding some thicknesses.

A primary reason for the higher speeds is that machine and fully-automatic applications allow for better control of adjustment than do manual operations. Distance between electrode and workpiece is held more constant, and movement along the seam is uniform. The hotter arc obtained with helium and d.c. can be controlled and moved along the seam rapidly. Manual welding of the same thicknesses, being slower

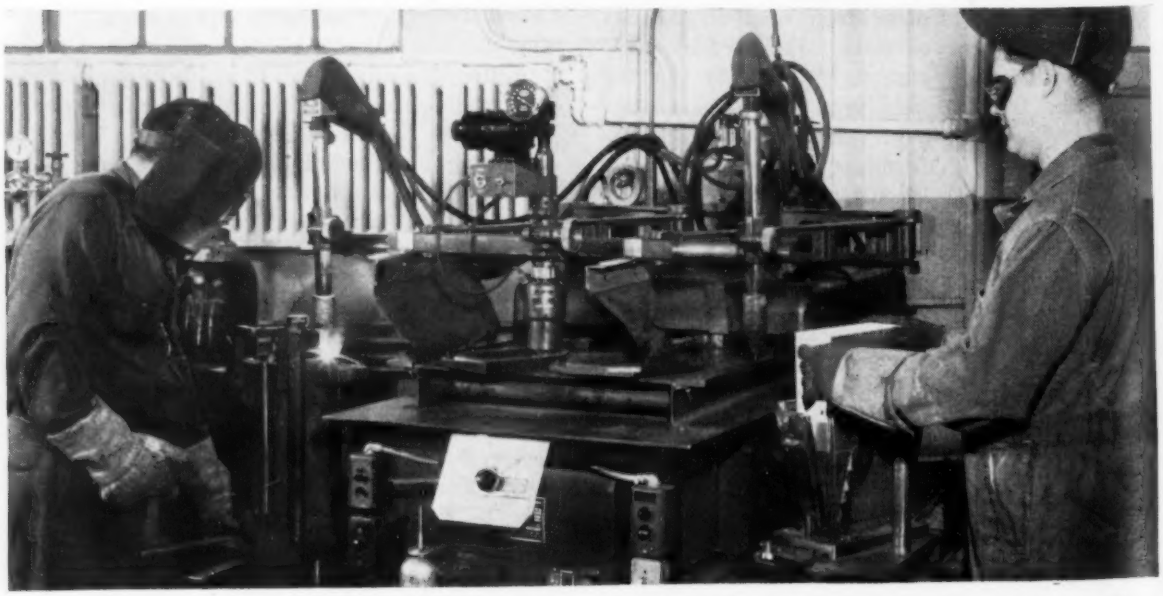


FIG. 1—A Planograph, adapted for two-torch operation, is guided by a magnetic tracer which follows a steel template. The continuous rectangular weld being made requires four changes in direction.

Aluminum Welding Production

and less uniform, would require the softer arc produced by argon.

Another factor which has helped to increase production speed is the adaptation of a Planograph for two-torch operation. This arrangement makes it possible to load one fixture, adapted for one box size, while the other torch is welding on a different box size as shown in Fig. 1.

One box is made of 0.064-in. thick 52S aluminum with a lid of the same material and thickness. It involves a 12-in. longitudinal seam, and a continuous rectangular weld 3½ x 6½ in. with four changes in direction to get around the corners. Helium flows at the rate of 50 cu ft per hr and 72 to 80 amp d.c. are used.

Steel templates, shown in Fig. 2 on a modified table, guide a magnetic tracer which controls the movement of the torches. Machine holders were adapted to fit the tracer bar which was extended to operate from either side of the machine. Controls for the tracer and current settings are at the front of the machine. Individual sets of starting switches for the shielding gas and generator are at each side.

The second box is also made of 0.064-in. thick aluminum but the lid is 0.090-in. thick. This box has an 8-in. longitudinal seam and a 3¼ x 7¾-in. continuous rectangular weld. Helium flow is again 50 cu ft per hr and 80 to 85 amp d.c. are used. The joint design itself provides the filler metal for the welds on both boxes.

Less risk of contamination

The third factor which contributes greatly to the higher production rate is the use of thoriated tungsten electrodes instead of standard tungsten electrodes. With thoriated tungsten electrodes, there is less risk of electrode contamination because the electrode clears itself quickly without disturbing the arc. They also have considerably greater current-carrying capacity. Because of the presence of thorium oxide on the surface of the cathode, the electrode generally emits about 90 times as many electrons per unit of surface area as a pure tungsten electrode.

Eighty boxes of each size are made daily with the new setup. As may be seen in Fig. 3, the welds are smooth, uniform, clean and sound. Because no flux is used, the possibility of flux entrapment is eliminated and post-weld cleaning is reduced to a minimum.

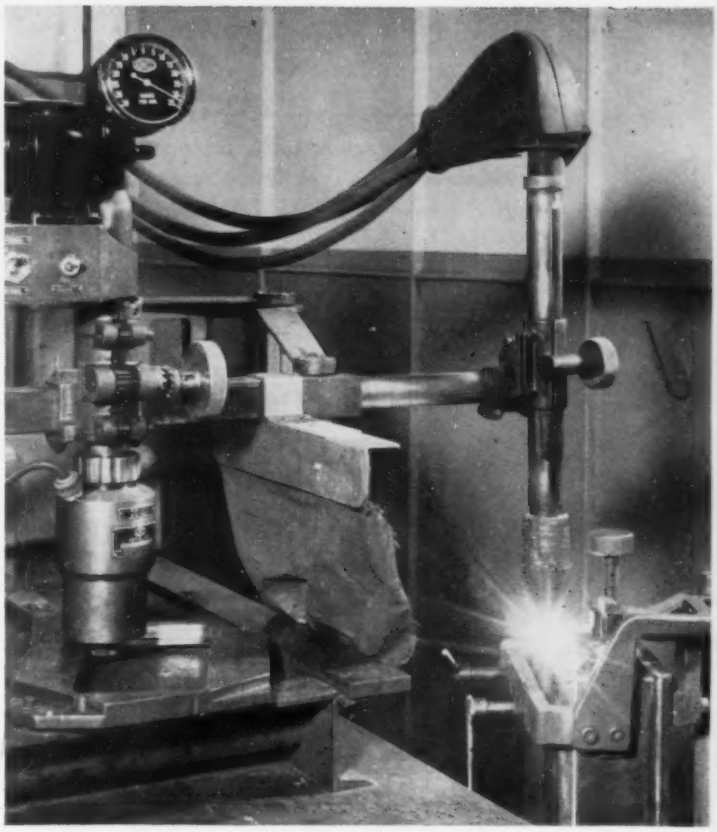


Fig. 2—Steel templates guide the torch around the perimeter of the aluminum box by means of a magnetic tracer. The tachometer shows the welding speed to be 32 ipm, about three times as fast as the former method.

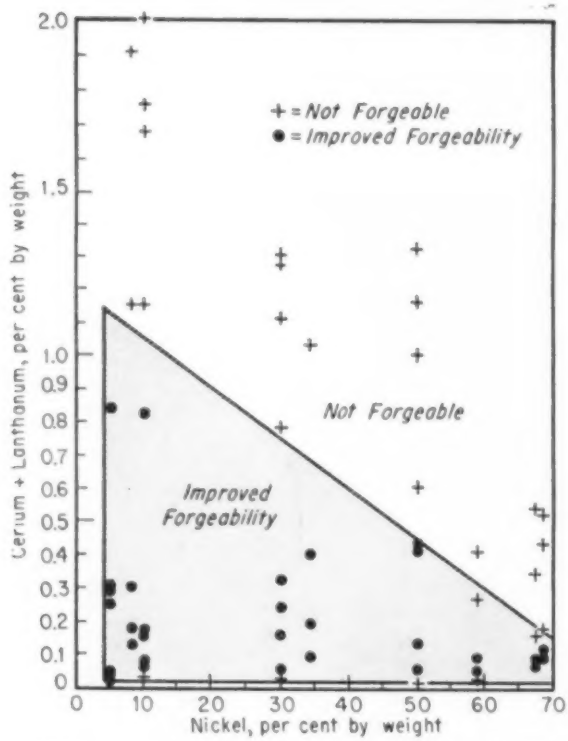
FIG. 3—Eighty such aluminum boxes of two different sizes are welded daily. The welds are smooth, sound, uniform and clean. Little post-weld cleaning is necessary and possibility of flux corrosion is eliminated.

Can help 18-8 too—

Rare Earths In Stainless

◆ Effect of misch-metal is compared to use of rare-earth oxides . . . Oxides can be beneficial but different effects are obtained . . . Oxides produce no significant residuals of cerium or lanthanum . . . Cerium fluoride ladle additions improve ingot surface and malleability of type 321 only.

◆ USE OF CERIUM and lanthanum in stainless steel continues to grow. The original paper[1] created much interest and subsequent articles have since appeared.[2] The authors have since expanded their research and tested not only more types of stainless, but also new types of rare-earth compounds.



NICKEL content affects the maximum and minimum residual amounts of cerium and lanthanum needed to improve hot-workability in austenitic stainless alloys.

Fig. 1 shows the range of cerium and lanthanum needed to overcome hot-shortness in alloys containing chromium, molydenum, tungsten, nickel and copper. Improvement in stainless grades ordinarily not workable have also been confirmed by additions of mixtures of rare-earth oxides and suitable reducing agents. A summary of their findings on misch-metal additions **only** are cited in Table I.

Ladle additions for stainless

Several products have recently appeared on the market in the form of mixtures of the rare-earth oxides together with borides, nitrates and silicon, which are supposed to reduce the rare-earth oxides at the molten steel temperatures. A typical analysis of such a purchased mixture is as follows:

50 parts rare-earth oxides which are 94 pct oxide
6 parts calcium boride (CaB_6)
4 parts sodium nitrate ($NaNO_3$)

The mixtures are used as ladle additions to stainless steels for the purpose of improving the hot-workability, as represented by improved prepared billet or slab yields. Ladle additions of the order of 1 to 4 lb per ton are used in the case of inherently ductile steels such as types 316, 308, 310, etc.

Differs from misch-metal

Experience to date with these mixtures, have not been able to detect cerium or lanthanum contents in the resulting steel. The authors searched for traces both by wet chemistry and spectrographic means and have concluded that no significant amount of cerium or lanthanum is recovered. Consequently, the mechanism of this effect obtained from the rare-earth mixtures is different from that of the misch-metal additions.

A summary of the authors' findings using rare-earth oxide mixtures are shown in Table II.

Tests using cerium fluoride additions to the ladle and the mold show improvement in ingot surface and malleability of austenitic steels containing titanium. No beneficial effects were obtained by using this compound in other stainless grades except type 321.

Brought Up to Date

TABLE I

EFFECT OF MISCH-METAL

1—Misch-metal additions to high-alloyed austenitic stainless steels, which are inherently hot-short, can transform them into ductile alloys. These types of alloys require the cerium and lanthanum contents to be 0.02 pct minimum, see graph.

2—Misch-metal additions to low-alloyed austenitic stainless steels represented by types 316, 308, 310, etc., where the metal is inherently ductile, can lead to improvements in hot-workability as judged by improvement in prepared billet or slab yields.

3—The larger misch-metal additions required for converting the inherently hot-short alloys into hot-workable alloys, and the smaller misch-metal additions improve hot-workability in grades like types 316, 308, 310, etc., suggest that cerium and lanthanum counteract the hot-shortness, and improve the fluidity and the ingot structure simultaneously.

TABLE II

EFFECT OF RARE-EARTH OXIDES

1—Rare-earth oxide mixtures improve the hot-workability of inherently ductile austenitic stainless steels, such as types 308, 316, 310, etc., as evidenced by higher prepared billet yields, at a significant reduction in cost, when compared with misch-metal additions.

2—Rare-earth oxide mixtures do not lead to improvements in the hot-workability of essential hot-short, or difficult to hot-work grades of austenitic stainless steels, where residual cerium and lanthanum contents of 0.02 to 0.25 pct are generally beneficial.

3—The recovery of cerium and lanthanum from the commercial rare-earth oxide mixtures is small, if not altogether absent.

TABLE III

EFFECT OF MISCH-METAL ON SULFUR

Case No.	Variation	Pct S Analysis	Pct Total Rare-Earth Content	Cone Forgeability
1	As melted, no misch-metal	0.007/0.007	....	Torn, poor
2	Added 12 lb of misch-metal per ton	0.005/0.005	0.16/0.17	Good, no tears
3	Added 0.01 pct S	0.010/0.011	0.10/0.10	Good, no tears
4	Added 0.02 pct S	0.023/0.024	0.04/0.04	Hot-short tears
5	Added 0.03 pct S	0.042/0.043	0.01	Badly torn: hot-shortness
6	Added 12 lb of misch-metal per ton	0.020/0.021	0.08/0.09	Good, no tears

An interesting technical paper delivered at the annual meeting of the American Iron and Steel Institute in New York was presented by C. B. Post, chief metallurgist, Carpenter Steel Co. For further details not covered in this summary, see AISI paper, "Use of Rare-Earth Metals and Compounds in Stainless Steel Melting," by C. P. Post and H. O. Beaver.

Spectrographic and wet chemical analysis showed no cerium is recovered in the metal with this particular practice. The authors believe that the cerium fluoride liquefies instantly and produces a fluxing action which gives a cleaner titanium bearing steel. The use of 2 oz per 1000 lb of metal gave 2.6 pct better billet yield on 30 heats of 12-ton electric furnace type 321 heats.

Effect on residual sulfur

The possible effect of misch-metal on the residual sulfur in the metal, and the possible effects of misch-metal additions on the residual hydrogen, nitrogen, and oxygen contents in the steel were investigated. An effect of misch-metal on sulfur in austenitic stainless steels was found when the sulfur content is in excess of that normally encountered with best conventional electric arc furnace techniques. One experiment, made to demonstrate this effect, was based upon purposely made sulfur additions to a high-frequency melted heat of the following composition: 0.046 pct C, 0.89 pct Mn, 1.12 pct Si, 20.23 pct Cr, 28.83 pct Ni, 3.69 pct Cu, 2.50 pct Mo. The heat was made in the normal manner and cones were cast after each variation in the furnace of misch-metal and sulfur. The results are as tabulated in Table III.

REFERENCES

[1] C. B. Post et al "Hot-Workability of Stainless Steels Improved by Adding Cerium and Lanthanum," Journal of Metals, Nov. 1951.

[2] W. E. Knapp and W. T. Bolkcom, "Rare Earths Improve Properties of Many Ferrous Metals," The Iron Age, Part I, April 24, 1952, p. 129; Part II, May 1, 1952, p. 140.

In case of emergency—

Titanium Can Replace Manganese for Su

By J. D. Roach
Senior Metallurgist
Titanium Alloy Mfg. Div.
National Lead Co.
Niagara Falls
and

R. S. Stewart
Cornell Aeronautical Laboratories
Buffalo

Part I

◆ Titanium as a desulfurizer is three times more effective than manganese . . . Also titanium can be used to prevent strain aging and grain coarsening . . . Practice is only good for killed steels.

◆ Average openhearth grades require 3.6 lb per ton of contained titanium or 7.8 lb per ton of manganese to offset the same sulfur content . . . Higher cost of titanium precludes use at present . . . Hot shortness of test steels measured by rolling rather than hot-bend impact tests.

◆ EACH NATIONAL EMERGENCY in the past 30 to 40 years has created the problem of conservation of strategic materials. Strategic materials are those elements vital to our national production that are not available in this country in sufficient quantities to meet the demands of industry. In terms of domestic availability, manganese is the most critical of the raw materials, essential to the production of all grades of steel, because 85 pct of the ore must be imported.[1] Manganese is a mild deoxidizer, forms a carbide and is used as an alloying element per se, but its important role historically is that of a desulfurizer.

Titanium has the same characteristics as manganese to various degrees. Though not as potent as aluminum, titanium is also a powerful deoxidizer. This report will be limited to titanium's role as a desulfurizer of killed steels. Since all steels contain certain residual manganese contents, titanium is confined to variable replacement of manganese and not its elimination, however, technically this too can be done.[2] Though zirconium can be used in lieu of manganese for sulful control,[3, 4, 5] titanium is better because of its higher recoveries and low silicon introduction.[6]

Titanium, as a means of sulfur control, was found to be considerably more effective than manganese since, on a percentage basis, more than three parts of manganese can be replaced by one part of titanium. Since titanium is an extremely strong deoxidizer, this replacement is restricted to "killed," fine grained steels in which titanium successfully prevents hot shortness when present in sufficient quantities. The minimum amount of titanium necessary to accomplish this effect

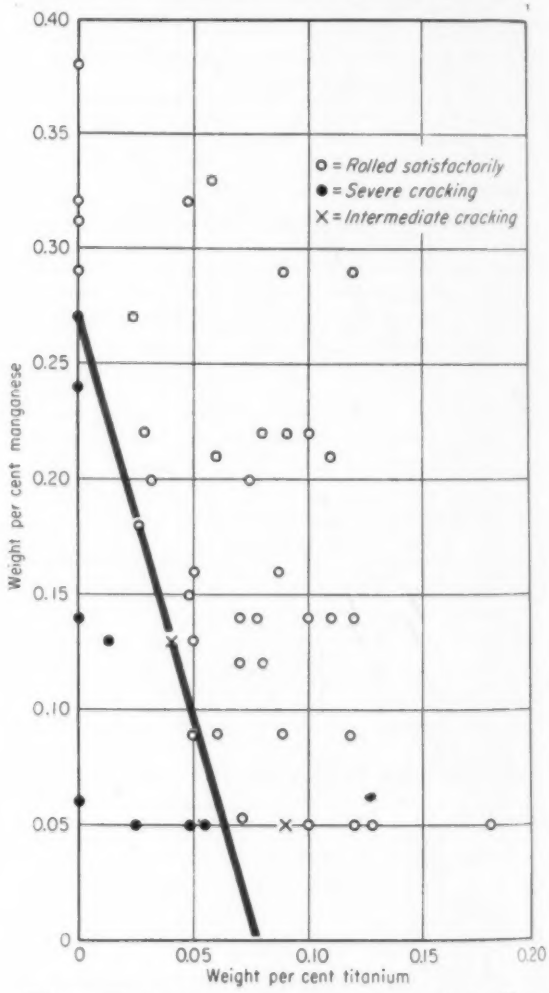


FIG. 1—Effect of manganese and titanium on hot rolling properties of 0.05 pct S steel. These percentages refer to the minimum amounts necessary.

for Sulfur Control of Steel

in a given steel can be precisely calculated.

An excess 0.05 to 0.10 pct Ti, which may be deliberately added as a safety factor, will result in a number of other beneficial results, the most important of which is the elimination of strain aging and the marked elevation of the grain coarsening temperature range.

Although titanium does form a stable compound with sulfur, the major criterion of effectiveness of an element as a substitute for manganese is its ability to overcome hot shortness. To study the effect of titanium on this property, a number of experimental heats were made and tested. These heats, containing various combinations of titanium, manganese and sulfur were evaluated with respect to hot shortness to determine, quantitatively, the extent to which manganese could be replaced by titanium. Various combinations were employed because, in practice, various residual manganese contents are obtained. For precise details, see section "Testing Procedure."

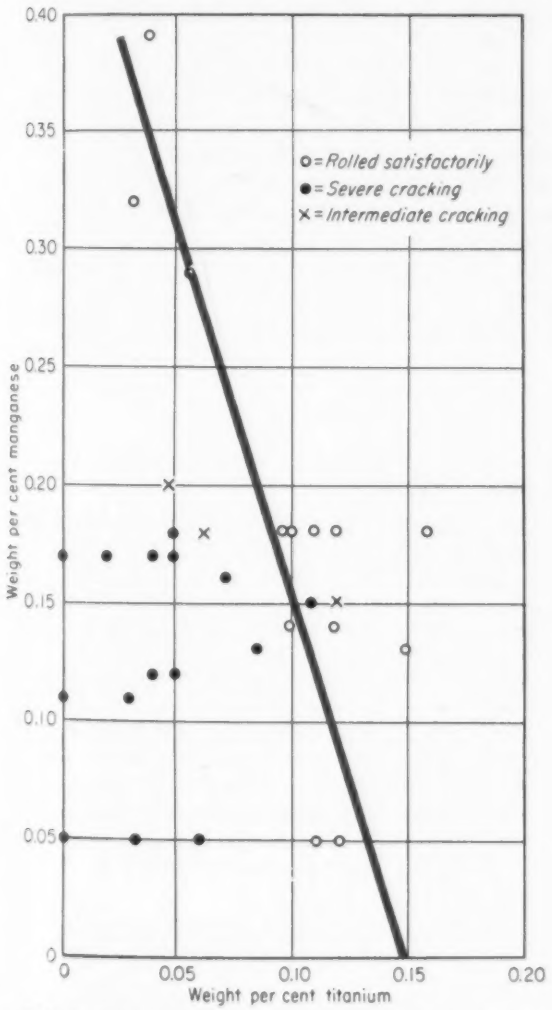


FIG. 2—Raising the sulfur to 0.10 pct, shifts the line to the right. Values are minimum amounts needed to prevent hot shortness.

To effectively determine the suitability of an element as a replacement for manganese, it is first necessary to establish the minimum manganese to sulfur ratio necessary to prevent hot shortness in steel under the given set of testing conditions. Only then can the effectiveness of the replacement be determined. This was accomplished by testing a series of heats of the previously listed base composition with 0.05 pct and with manganese to sulfur ratios varying from 1.2 to 8.2 and containing no titanium.

The second series of the same base composition had no intentional manganese addition, but did contain enough titanium to give titanium to sulfur ratios of 0.5 to 3.6. Although no manganese additions were made to this series, they contained approximately 0.05 pct Mn picked up from the ingot iron of the charge. The remaining heats tested contained various combinations of manganese and titanium so that the economical balance of the two elements in preventing hot shortness could be determined. In this latter phase of testing, two sulfur contents were employed, 0.05 pct and 0.10 pct.

The first series of rolling tests at approximately 235°F on 0.05 pct S steels revealed that cracking due to hot shortness occurred if the manganese content was below approximately 0.27 pct with no titanium present. Similar results occurred when the titanium content was below approximately 0.075 pct with a residual manganese content of 0.05 pct or lower. With this base composition, containing 0.05 pct S, 0.12 pct Ti was more than adequate to replace 0.24 pct Mn and 0.09 pct Ti was approximately equivalent.

When either element was used singly, the following ratios were found to represent the minimum amount of each necessary to overcome the harmful effects of sulfur under the given set of testing conditions: (1) Manganese to sulfur ratio = 5.4; (2) titanium to sulfur ratio = 1.5. The titanium to sulfur ratio of 1.5 represents the stoichiometric requirement for the stable compound titanium sulfide, TiS. However, the manganese to sulfur ratio of 5.4 represents a considerable excess of manganese over the stoichiometric requirements for manganese sulfide, thus indicating that titanium is considerably more ef-

Where titanium replaces manganese, only one third as much is needed for sulfur control . . .

fective than manganese in combining with sulfur in steels.

When various amounts of titanium and manganese are used to combat the effects of sulfur, it appears that the minimum amounts of each required are in direct proportion. The results obtained from hot rolling tests on those steels containing 0.05 pct S with various combinations of titanium and manganese are summarized in Fig. 1. The percentage of titanium required as a partial replacement for manganese in steels containing 0.05 pct S can be calculated from the following equation derived from Fig. 1:

$$\text{Pct Ti} = \frac{0.27 - \text{Pct Mn}}{3.6}$$

where the percents titanium and manganese represent the actual content of the steel. The percentages under discussion refer, in each case, to the minimum amount necessary to accomplish the desired effect.

From the above equation, the manganese content necessary to effect satisfactory sulfur control is approximately three times as great as the amount of titanium that would be required for the same purpose. On a partial replacement basis, one part of titanium can replace slightly more than three parts of manganese. For example, an 0.05 S pct steel requires 0.27 pct Mn to overcome the harmful effects of sulfur; however, 2/3 of the manganese content or 0.18 pct, can be replaced by 0.05 pct Ti and still have the steel retain its hot working properties.

A similar relationship was established with steels of the same base composition containing 0.10 pct S. The results obtained on these steels containing various combinations of titanium and manganese are summarized in Fig. 2. The balance between the titanium and manganese contents necessary to eliminate hot shortness in these steels can be calculated from the following equation derived from the straight line plot of Fig. 2:

$$\text{Pct Ti} = \frac{0.54 - \text{Pct Mn}}{3.6}$$

The above equation is valid for steels containing 0.10 pct S and indicates the minimum amounts necessary. From the two specific equations derived from the data obtained on those steels with 0.05 pct and 0.10 pct S, a general equation may be derived from which the correct balance of manganese and titanium may be calculated for any particular sulfur content.

This equation is as follows:

$$\text{Pct Ti} = \frac{5.4 \times \text{Pct S} - \text{Pct Mn}}{3.6}$$

From the manganese to sulfur ratio previously determined, it can be shown that an 0.08 pct S steel requires a minimum of 0.44 pct Mn to effectively eliminate the effects of sulfur. It may be calculated that hot workability in this steel could still be retained with a minimum of 0.15 pct Mn if 0.08 pct Ti were also present in the steel.

The only published investigation in which the

How the Ti steels were prepared and tested—

The steels tested were made in a 30-lb, high-frequency induction furnace using conventional melting procedures. The charges for the heats consisted of ingot iron slugs, low carbon ferromanganese to give the desired manganese content, iron sulfide as the source of sulfur, pig iron to adjust the carbon content, and Steel Foundry Ferrotitanium* containing approximately 30 pct Ti as the source of titanium. Each heat was thoroughly deoxidized with silicon. The titanium was added after the other ingredients had melted and just prior to pouring the heat. This was found to be most consistent with optimum recovery. The heats were cast into 15-lb cast-iron ingot molds. The ingots were allowed to cool to room temperature before reheating to the hot working temperature.

* Trade Name, Titanium Alloy Mfg. Div., National Lead Co.

The base steel analysis selected for this investigation was 0.12 to 0.17 pct C; 0.20 to 0.40 pct Si; and 0.025 pct P maximum. The carbon range was selected because it encompasses the 0.15 pct C grades which are known to be most critical in their rolling characteristics. Two series of heats with this base composition were made, the first contained 0.05 pct S and the second contained 0.10 pct S. In each series, predetermined variations were made in the manganese and titanium contents and some heats were made with only one of these two elements present to quantitatively determine the minimum amount of each, when used separately, required to prevent hot shortness in the base steel under the prescribed set of conditions.

A number of rather elaborate tests have been devised for evaluating the hot shortness of steels in a quantitative manner. Sauveur,[7] Clark[8] and Ihrig[9] have described procedures for a hot twist test in which the number of revolutions to fracture at a

problem of manganese replacement was attacked in a manner similar to that employed in this investigation was the recent work of Austin.[6] In his experiments, the width of the hot-short temperature range, as judged from hot-bend impact tests, served as the criterion for measuring hot shortness. His results show that in low manganese steels (0.05 to 0.15 pct Mn) with between 0.02 and 0.05 pct S, titanium may be satisfactorily employed to overcome hot shortness provided the ratio of manganese plus titanium to sulfur is maintained above approximately 6:1. This is not entirely in accord with the results of this investigation.

The main point of discrepancy appears to be the ratio in which titanium can replace manganese for sulfur control. Austin's equation of (Mn + Ti = 6 S) indicates that titanium can successfully replace only an equivalent amount of manganese. However, the results of this investigation revealed that titanium is more than three times as effective as manganese in combating hot shortness. Therefore, a simple (Mn + Ti) : S ratio cannot hold since the comparative effectiveness of the two elements must be considered. The ratio, as determined by this investigation, 3.6 Ti − Mn = 5.4 S, should be valid. However, this ratio represents the minimum amounts necessary to prevent hot shortness.

All the titanium treated steels tested by Austin forged and rolled satisfactorily and only in the hot-bend impact test could any indication of hot shortness be found. It is believed that the discrepancies between the two equations are due to the methods used in judging hot shortness. Also, the hot-bend impact test is too critical since the amount of deformation to which the steel is subjected is considerably more than would be experienced in normal rolling operations at the mill.

In certain instances, complete or even partial replacement of the manganese by titanium would not be feasible. Because titanium is a strong deoxidizer, it would be impossible to use it to control sulfur and still have a rimming steel, since titanium combines more readily with oxygen than with sulfur. However, a sufficient quantity of killed steel is produced annually so that a measureable relief to the manganese shortage might be obtained by substitution.

In transposing results from laboratory 15-lb ingots to production ingots, the large difference in solidification rate encountered would, no doubt, have a definite effect. However, the results should serve as a good first approximation for the minimum requirements of commercial practice. Also, the small test ingots were allowed to go cold and undergo the gamma to alpha transformation before reheating to the forging temperature. Commercial ingots are usually taken to the soaking pit and reheated for rolling before the metal has undergone this transformation. According to McCance,[11] the sulfide films at the grain boundaries are disrupted by this gamma to alpha transformation, thereby increasing the hot workability of the steel. Discrepancies would normally be expected in attempting to transpose data obtained on small laboratory heats to commercial size ingots. Nevertheless, it is believed that the comparative results obtained in this investigation would be valid as a starting point since all ingots were processed and tested in the same manner.

Part II of this article will appear in next week's issue of The Iron Age.

given temperature is taken as a criterion of the workability of the steel. Ellis[10] used a hot-impact compression test in which the susceptibility to hot shortness was judged by the percent reduction in height before cracking occurred. Numerous other methods, such as hot 180° bend tests, hot compression tests and hot-impact bend tests have been used.

The first method of attack used in this investigation was a hot-upset forging test. The procedure for this was similar to the hot-impact compression test as hot shortness was evaluated by the percent reduction in height prior to cracking. However, the initial work indicated that determination of hot shortness by this technique was entirely too insensitive. The results of actual hot rolling tests on the steels were found to be considerably more significant. Therefore, the majority of results reported in this investigation were obtained by actual hot rolling methods.

The rolling was accomplished on a Merchant type hand mill using grooved rolls. The original size of the cast ingots was 6 in. high, without hot top, tapered from 2¾-in. square to 2½ in. The first groove in the rolls was set at a 2½-in. opening. From there, the amount of reduction per pass was controlled so that nine passes were required to reach the final size of 1-in. round cornered square. The first six passes were adjusted so that a reduction of 3/16 in. was obtained on each pass while the last three passes each reduced the billet ⅛ in. The draw temperature employed in these rolling tests was 2350°F with a finishing temperature of approximately 1700°F.

Cracking, in any of the steels tested, before the final size was reached served as an indication of hot shortness and the number of passes prior to cracking indicated its severity. Forty-eight ingots of the previously described base analysis and with predetermined variations in manganese, sulfur and titanium were tested in this manner.

A fine pitch—

ONE Man's Opinion of ONE Chain Drive

by Q. J. Kearney
Consultant
Lansdowne, Pa.

◆ "How I arrive at a 10-hp, 23-tooth DR, 54-tooth cast iron DN, triple strand ½ in. pitch No. 40-3 chain drive goes something as follows":

◆ I DO NOT WISH to imply that when you have a chain drive design job that you throw all the catalogs in the basket. However, even chain drive engineers with 20 years' experience like me can get slightly fouled up as you will see in due course.

My troubles start on this ventilating fan job because I make the mistake of recognizing a few factors which should be taken into consideration. I wish to design a low-friction, long-lived, quiet chain drive within reasonable cost and efficiency. Now the drive I have to dream up connects an 1800 rpm motor to a fan requiring 8.2 brake horsepower at 750 rpm. Sure it sounds simple but hang around awhile.

I know it is good economics to use the longest link chain the rotative speed will allow. By referring to the maximum rpm table in the book I note that I will have to use ½ in. pitch, which is smooth running up to 2400 rpm.

Of course I want enough teeth in the driver pinion so that the flexing of chain over or around this small sprocket will not be too sharp. I want to retain within reasonable limits the angular velocity of the chain as it comes around the small sprocket. Therefore I want as many teeth in the driving sprocket as the limit on chain travel will permit.

Some chain drive engineers, I know, contend 1600 rpm is too conservative a figure for maximum chain travel. They say, in loud voices, to use fine pitch chain, large number of teeth, with resultant high speed, high capacity, narrow width chain. They further contend the result of the greater number of teeth in contact gives light tooth pressures that more than offset any adverse effects of high chain travel. And many such drives are operating smoothly with a slight metallic hum but no objectionable hammer blow action or noise as found in spur gear drives.

However, it is not my mission to resolve the highly complex and conflicting opinions of chain drive engineers, but to design a good conservative chain drive which will operate satisfactorily for at least eight years else I get fired. Therefore I will take 23 teeth for the driver sprocket, some other opinions notwithstanding, which will give a chain travel of 1680 fpm which some authorities may consider high indeed. So far I pay no attention to the load or prime mover, on purpose. In fact, the electric motor can be forgotten as it operates smoothly. I will not have to add to my safety factor on account of the motor even if some creep starts it abruptly, across-the-line.

Since ventilating engineers can accurately pinpoint the brake horsepower of a fan, I will take their figure of 8.2 hp as the maximum load. The fan runs smoothly but I will have to provide for the fact that it will operate sixteen hours per day, maybe 7 days a week.

As chain wears, links ride high

From the tables I note that ½-in. pitch, No. 40 roller chain with 23 tooth sprocket at 1750 rpm is rated 3.67 hp per strand. Three strands of chain will provide capacity of 11.01 hp which should be O.K. on smooth fan drive of 8.2 bhp even though it is operating 16 hr daily. To offset the wear of the long operating day, I bet on the comparatively small number of teeth in the drive sprocket. This has a favorable effect because in time the chain will wear and stretch or increase in pitch, despite all adds to the contrary, whereas the pitch of the sprocket remains the same regardless of wear.

As the chain wears, the links will ride higher on the sprocket teeth. If permitted to operate, the wear will make the chain so sloppy it will jump the sprocket teeth or skip a tooth. It will always do this on the larger of the two sprockets first. This most discouraging action always occurs first on the larger of the two sprockets because more worn links are in contact and the sum total of the wear is greater. Therefore it is

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QUINTIN J. KEARNEY spent 11 years as design engineer for a large chain drive company. Later as a manufacturer's representative, he specialized in electric drives for machine tools.

"I just think about this bore at the last minute and am too lazy to refigure the drive with larger sprockets."

much more desirable to have my 54-tooth driven sprocket than one of say 159 teeth.

At this stage I come to the following conclusions: a 10-hp chain drive, 23-tooth steel DR; 54-tooth cast iron DN; triple strand ½ in. pitch No. 40-3 chain. Of course I only start to scratch the surface so far as to the pros and cons of chain drive design. I have a roller chain instead of the silent type on account of the short 12-in. center distance. This is too short for silent chain as it will not permit flexing or backbend of the special joint as it leaves the 23-tooth driving sprocket except in more than one piece which would not be acceptable, I'm sure.

Since this is a ventilating fan and noise is a factor, I will not harden the 23-tooth sprocket but will have it cut from high carbon bar stock. This will drive the machine shop crazy but that is their worry. I will have to keep the hub diameter as large as possible since the 3.94 in. OD sprocket will be bored for the 1⅝-in. diam. shaft of the frame 324 motor. I just think about this bore at the last minute and am too lazy to refigure the drive with larger sprockets.

Now if you doubt the wisdom of my choice of this drive and if you insist on engineering for engineering's sake, let me point out short cuts on the slide rule and also take a look behind the rating table of basic chain loads.

To find chain travel set slide rule:

A Scale	Setting Motor RPM	Reading Chain Travel

B Scale Number of pitches per foot Number DR teeth

A Scale	1750	1680 RPM
B Scale	24	23

To find chain pull or working load of chain and bearings:

$$\frac{10 \text{ HP} \times 33000}{1680 \text{ FPM}} = 196 \text{ lb}$$

Under 10 on A scale place 1680 on B scale and read 196 on A scale above 33000 on B scale.

Our tables show that 40-3 chain has average ultimate strength or breaking strength of 11,000 lb. "Average" means that we hope that chain made from one heat of steel only varies somewhat from chain of another heat and that processing may also vary slightly in spite of present day manufacturing control. But only very slightly, we hope. In this case we find that even if the strength of my chain is considerably less than the published figures I am still safe as I have a Safety Factor of:

$$\frac{\text{Breaking Strength} - 11{,}000 \text{ lb}}{\text{Chain Pull} \ldots\ldots\ldots\ldots 196 \text{ lb}} = 56 \text{ Safety Factor}$$

Now we all know that a factor of 40 would be plenty so that my chain drive as designed should be home free, as they say in Show Biz.

Wrangling costs money—

For Your Profit Industry Defines BASIC INDUSTRIAL IDEAS

◆ Here's a way to reduce over-the-table wrangling on the meaning of basic terms used in industry . . . Brought to you by The Iron Age as a special industry service, you can save time and money by applying these definitions to your management problems.

◆ Communications and understanding between departments and between management and labor will be speeded where there is common understanding of the language of industry . . . Four years of research and the contributions of more than 100 industry, engineering and industrial management experts have contributed to the making of this invaluable reference material.

◆ INDUSTRY PAYS DEARLY for the countless hours of wrangling—both within the organization and between management and labor—which stems from lack of agreement on the meanings of basic terms. Thousands of productive manhours and wage dollars are lost each year in disagreement over the meaning of a *fair day's work* or *methods*. Many organizations suffer competitively because a term means one thing to the development engineer, another to the production engineer, and still a third to the sales manager.

Escape from the costly entanglement of misunderstood terms has long been sought by the scientific managers of modern industry. Four years ago the Society for Advancement of Management began the tedious research which today supplies the answer to this problem. That answer is a clear and authoritative definition of functional concepts basic to modern industry. It is based on the wide personal experience of many management and industrial engineers and executives. These definitions, first presented in the Society's new *Glossary of Terms Used in Methods, Time Study, and Wage Incentives*, are brought to you by THE IRON AGE as a special industry service.

Here is a basic frame of reference that can effect large annual savings through clearer communications. It opens the path for better understanding of goal, elimination of costly, nonproductive wrangling, and a greater unity of effort.

The definitions are not proposed as final, for they must function within the progressive dynamics of today's business. Terms are defined on the basis of their interpretation by the greatest number of experienced people using them professionally and successfully. This procedure most closely satisfied the need for accuracy and unanimity without implying dogmatism.

Proprietary terms such as Bedeaux plan and Halsey plan which are clearly described in standard references have been omitted. Omitted also are terms of local flavor or restricted use, and terms whose conventional definitions have remained unchanged under the impact of business usage.

Although the terms are largely the stock vocabulary of the industrial and management engineer, they also belong to the language of many other areas of the business organization. This is largely due to growth of scientific management in industry. The increasing stature of scientific management is one of the most significant advances in the development of our industrial economy.

ADDITIONAL COPIES

Copies of this valuable Glossary of Terms Used in Methods, Time Study and Wage Incentives may be obtained for $1.00 from the Society for Advancement of Management, 74 Fifth Ave., New York 16.

Abnormal Reading: A stop watch reading of an element of work that is out of line and too large or small because of some external factor that is not present during the normal performance of the element of work.

Abnormal Time: A time obtained on time study of abnormal work methods or under abnormal job conditions, variations due to workplace having been accounted for.

Activity: 1. The identification of a certain phase or function of an organization. 2. The rate of sale or production of an item. 3. That part of operating or budgeted capacity actually spent on an operating basis.

Actual Hours on Standard: That period of time during which an operator group or organizational unit works on operations measured by allowed or standard time.

Actual Time: The clock time spent on an operation by an employee or group.

Alignment Chart: See Nomograph.

Allowance: An addition to the normal time of a job to provide for fatigue, personal needs, delays, and special conditions inherent in the job.

Allowed Hour: See Standard Hour.

Allowed Hour Plan: See Standard Hour Plan.

Allowed Time: Time required to perform an operation at normal pace under standard conditions plus time required for rest, personal needs, and occasionally, delays. This is also known as standard time, time standard, time allowance, time value.

Alternate Standard: A standard used when there is an alternate method of performing the same operation, the difference being caused by tools, equipment, or material.

Annual Saving: Differential between previous cost and cost after improvement expressed on a yearly basis.

Attendance Time: The period during which the employee cannot perform work, is not required by operations in progress to be attentive to the process, and may relax or await a signal.

Attention Time: An element of an operation which consists of observing, or being in position in readiness to act, but not actually performing manual work.

Average Earnings: The total earnings for a given period worked divided by the units of time worked during the period.

Average Elemental Time: The sum of the individual elemental times for a given element exclusive of abnormal values, divided by the number of occurrences exclusive of abnormal recordings.

Average Hourly Earnings: The total earnings for a given period worked divided by the hours worked during the period.

Average Selected Time: See Averaging Selection Method.

Average Straight Time Hourly Earnings: The total earnings for a given period worked including incentive earnings based on production, but exclusive of overtime, shift, and other premiums based on working conditions divided by the hours worked during the period. May be abbreviated A.S.T.H.E.

Averaging Selection Method: Selection of an elemental time by taking the arithmetical average of accepted elemental times as in Average Elemental Time.

Avoidable Delay: An interruption that is within the control of the operator in the continuity of an operation.

Base Pay: See Base Rate.

Base Points: Total points credited all jobs for basic conditions (Job Evaluation).

The number of points under some incentive plans credited for standard protection above which extra points are added for additional production (Wage Incentives).

See Point.

Base Rate: The pay expressed in dollars per time period to which other considerations in wages are added such as incentive premium, overtime, shift bonus. The hourly rate of pay on which incentive earnings are based. Generally a guarantee. Also called Base Pay.

Base Time: Elemental time without any applied factors such as incentive or personal, fatigue, and minor delay allowance. Called Fast Time under some incentive plans.

See Fast Time.

Base Unit: A standard of measurement used within a wage payment system.

Basic Data: Standard elemental times determined by many observations under varying conditions of the same element.

Basic Piece Rate: A price per piece which does not vary with rate of production.

Bonus: A broad and often loosely applied term which refers to any payment above that which is regular. It includes extra payments such as those for night work, regular attendance, and overtime, as well as any annual or regular allotment such as a Christmas bonus. It sometimes refers to earnings of employees on wage incentive that are above the base or guaranteed rate. The term must be exactly defined in any given instance.

Bonus Earnings: Wages over and above the base rate as the result of a bonus payment. May or may not be related to improved performance.

Bonus Plan: An arrangement whereby a bonus is awarded in accordance with a definite plan.

Break-Even Performance: 1. Under an incentive plan, the point where any improvement in performance would result in incentive premium. 2. The

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Here is a basic source of reference . . . Its use can effect large annual savings by improving understanding between groups in your organization.

level of performance where there is neither profit nor loss.

Break Point: See Breaking Point.

Breaking Point: The division point between consecutive elements or the ending of one element and the beginning of the next one.

Check Study: In time study work, a time study made to check an existing standard.

Chronological Study: A time study usually rough over a relatively long period such as a day which records events in the order in which they occur. Usually made on non-repetitive and semi-repetitive operations. Often used to secure an overall picture and to check frequency, nature, and duration of delays.

Class Rate: A wage rate for a certain labor grade that may include several jobs.

Clean-Up: 1. The final phase of a work cycle which follows the "do" part of the job. Elementary operations performed in each job are often divided into 3 classifications (A) "set up", (B) "do", (C) "clean-up" operations. Examples of "clean-up" operations include unload jig, dispose parts, lay aside tools, etc. 2. Time allowed for the operation of cleaning an area or machine after a job or at a specified time. 3. Also used to designate an established time in a working day when employees stop work, change clothes, and wash preparatory to quitting for the day or lunch period.

Color Code: Method of using colors to accentuate variances in a drawing or print. Used to identify piping, tote boxes, traveler tabs, etc., as to particular use or destination.

Comparison Sheet: A tabulation of time study data so arranged that comparisons can be made. Is used for building up standard data.

Conditions: As used in both job evaluation and time study are working conditions which affect the operator during an operation but which do not directly affect the operation. Such factors as heat, light, and humidity are typical "condition" factors since they influence the fatigue, attitude, and therefore, the general performance of the operator.

In time study, usage also covers all factors directly affecting an operation such as method, job layout, feeds, speeds, equipment, materials, designs, and quality.

Consistency: In time study, the degree of uniformity in the time taken by an employee to perform a given element over a number of cycles in any given time study.

Also used in referring to the relation between standards or data for similar work.

Constant Element: 1. An element for which the standard time is always the same regardless of changes in size, weight or other characteristics of the job. 2. An element that is fixed and does not vary in time per occurrence.

Constant Sharing Plan: A plan in which employee participation in incentives remains uniform.

An incentive plan with a straight line incentive pay curve. The breaking point can be any performance level and the pay line can have any slope from 0° — 90°.

Constant Time Element: See Constant Element.

Constant Total Cost Plan: An incentive plan with a pay curve that holds the total cost per piece (labor plus overhead) a constant. This is very rare.

Constant Unit Labor Cost Plan: An incentive plan that holds the unit labor cost a constant. This is the most usual type of plan. Unit labor cost is constant when incentive premium is being earned.

Continuous Method Timing: Time study method in which timepiece runs continuously. Readings are taken at breaking points and the observed elemental times are obtained by subtraction.

Continuous Watch Reading: Reading obtained by the continuous method of timing.

Control: Any method or set of circumstances which promotes a regulatory effect on cost or production.

Controlled Machine Time: That portion of the total cycle of an operation which is mechanically paced by a machine and can not be influenced by the employee's skill and effort when the operation is run according to standard method.

See Restricted Elements.

Correct Rate: 1. A standard time or piece rate on which an incentive employee may attain incentive earnings commensurate with effort and skill applied. 2. The evaluated occupational hourly rate as opposed to an individual personal rate.

Cost Reduction: Any one action or a combination of actions which re- duce cost.

Coverage: The per cent completion o a given function, program, or job Specifically for time study—the pe cent of direct and indirect labo actual hours to which time stand ards have been applied.

Cumulative Timing: See Continuou Method Timing.

Also, a method of timing whic permits the direct reading of th time for each element by the use o two stop watches. The watches are mounted close together on the stop watch board and are connected by a lever mechanism in such a way that when the first watch is started the second is automatically stopped. When the second watch is started the first watch is stopped. The watch may be snapped back to zero immediately after it is read, thus making subtractions unnecessary. The watch is read with greater ease and accuracy since the hands of the watch are not in motion at the time it is read.

Curve: A linear graph which represents the corresponding value of one factor, shown by a vertical scale, in relation to another factor, shown by a horizontal scale. In good time study practice Time is placed along the vertical scale and Dimension along the horizontal scale.

A line representing the trend or true average of a number of points on a graph. A proper curve can be resolved to a mathematical formula.

Cycle: A sequence of elements in the performance of a task, in which after the last element is completed for one unit of production, the first element is again normally started for the succeeding unit of production with the other elements following in like order.

An interval or space of time in which is completed one round of elements that recur regularly and in the same sequence.

Cycle Effort-Controlled: An operation in which the effort of the operator is the controlling or regulating factor in determining the amount of production.

Cycle Machine-Controlled: An operation in which the speed or action of a machine is the controlling or regulating factor in determining the amount of production.

See Controlled Machine Time.

Turn to Page 161

Technical Briefs

BIG TUBE DIES:

New 18-in. tube reducing machine will use 7500 lb dies.

Tubes up to 18 in. in diam will be processed on a giant compression tube reducing machine now under construction for Tube Reducing Corp., Wallington, N. J. Largest compression reducer now being used takes an ingoing tube of 6½ O.D.

The new machine will be over 100 ft long and use dies weighing over 7500 lb each. When completed, it will produce precision seamless tubing ranging in size up to 17-in. in diameter, with walls as light or lighter than 0.125-in. in 10-in. tubing, 0.175 in 14-in. tubing, and 0.200 in 16-in. tubing. Already several sets of the 50-in. diam dies needed to operate the 18-in. machine are being processed at Midvale Co.

Start With Ingot

Tube Reducing has on order a Cincinnati Hydrotel milling machine with 36 x 168-in. table and a 64-in. Bullard. After this equipment is set up at the Wallington plant, the only outside work necessary will be rough machining of outside diameter and side faces.

Processing of dies at Midvale's shop starts with an ingot weighing close to 20,000 lb. The ingot is machined to about 10,000 lb before splitting. First rough turning of OD is done on a Bullard. Groove is rough turned to minimum diameter and flat faces machined. After the die is split longitudinally (with circular saw that takes 1-in. cut across diameter) dies are ready for shipment.

Heat Treated to Rc 55 to 60

Center line and side faces will be remachined with a Hydrotel horizontal miller. Then the keyway will be cut. Next step presents a tough machining problem because the groove in the die must now be tapered, using Hydrotel attachment on miller. Die is then heat treated to Rc 55 to 60.

Flat surfaces are finished ground on a Mattison surface grinder, specially constructed for the job with high clearance under wheel and wall guard that drops down in the keyway. Final step is grinding outside diameter and finishing tapered groove on Hydrotel machine. Finished die has 31-in. die face width and 50-in. diameter.

Aircraft Applications

The light-wall seamless tubing produced by Tube Reducing in existing smaller machines is used extensively in the manufacture of jato and rocket bodies, steel cores for propeller blades, spars for helicopters, braces and struts for aircraft landing gear and flap controls.

The new large tubing will also be used for making large sized ring-shaped parts, cylinders, accumulators, casings, large volume pressure conductors and products for thin-walled, high-strength applications.

MOCK-UP of 50-in. diameter die designed for use on 18 in. tube reducing machine at Rockrite Div. of Tube Reducing Corp., is compared with 6½-in. dies used on existing machines.

IF YOU WANT MORE DATA

You may secure additional information on any item briefed in this section by using the reply card on page 117. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

INDUSTRIAL ENGINEERING:

Glossary of terms helps cut needless wrangling.

Continued from Page 158

Cycle Timing: 1. The observance of the total time of a cycle. 2. Also, a method of timing very short elements. Under this method the sum of all elements but one in the cycle is timed. The observer times as many cycles as there are elements, omitting a different element each time. By means of a simple calculation the time for each element of the cycle may be found. This method is also known as cyclic timing and is questioned by some.

Cyclic Element: An element which occurs regularly during each cycle.

Cyclic Time: Sum of all the elements occurring on each and every cycle.

Cyclic Timing. See Cycle Timing.

Day Rate: The rate of pay for performing work not covered by allowed time or the rate of pay per hour where there is no wage incentive.

Daywork: Work performed which is paid on the basis of a rate per unit of time worked regardless of production. Work not covered by incentive standards. See Day Rate.

Decimal Hour Stop Watch: A stop watch with face divided into decimal parts of an hour and with sweep hand making one revolution in a decimal part of an hour. A watch used in making time studies. The sweep hand makes one hundred complete revolutions in one hour, and the dial is calibrated in ten thousandths of an hour.

Pushing the stem does not stop the watch, but resets the hands to zero. A button on the side of the watch stops or starts its movement.

Decimal Minute Stop Watch: A stop watch with face divided into decimal parts of a minute and with sweep hand making one revolution in a minute. A watch used in making time studies. The sweep hand makes one complete revolution in one minute, and the dial is calibrated in hundredths of a minute.

Pushing the stem does not stop the watch, but resets the hands to zero. A button on the side of the watch stops or starts its movement.

Delay Allowance: An allowance included to compensate an employee for time lost due to delays beyond his control.

Glossary

Continued

Delay: An interruption which may occur in any operation that interferes with or prevents an operator or equipment from working continuously.

Differential Piece Work: Work performed at piece rates where one rate is used for production of a fixed quantity in a given time, and a different rate is used for production beyond the initial quantity and time.

Direct Labor: 1. Term used to describe those operations which are recognized as assignable directly to particular products and which can be readily costed individually by product and operation. 2. Labor that is applied to each piece or unit of product.

Discontinuous Timing: Timing of a portion of the total elements within a cycle.

Dispose: Moving material from the immediate operation work area and releasing it. Usually considered an element of a job. Opposite of Get.

Earned Rate: The average hourly wage including incentive earnings. According to local usage, may or may not include overtime, shift differential, and so forth.

Efficiency: In wage incentives, actual output divided by standard output and expressed as a percentage.

Effort: As associated with time study rating, effort does not imply energy expenditure, but indicates the level of performance displayed by the observed operator. Has the same meaning as pace, speed of movement, rate of activity, etc., and is generally related to a bench mark or concept of normal under an incentive plan. The will to work exhibited by an operator in his actions on the job.

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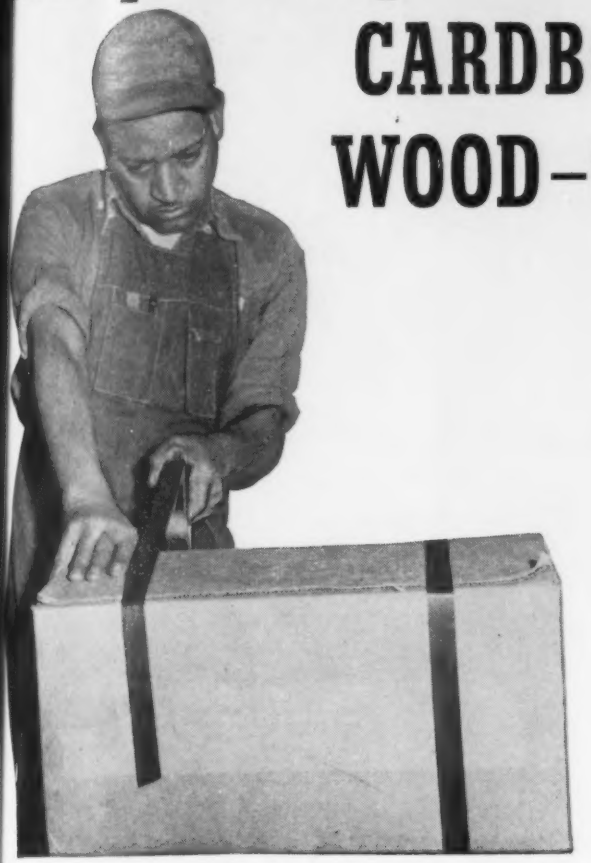
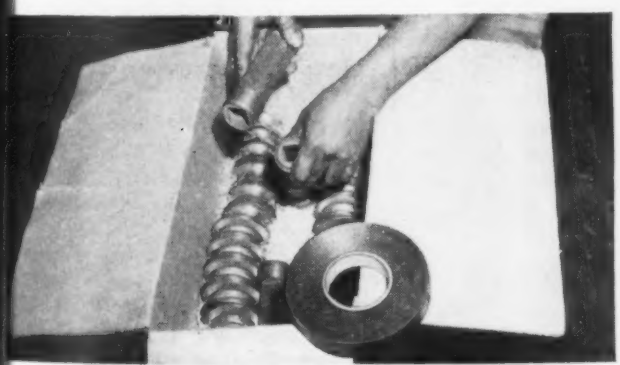
Slicing the ham a little thinner these days aren't you, Mike.

Heavy metal parts now shipped in CARDBOARD instead of WOOD—thanks to new tape!



120-pound cartons are quickly, easily and neatly sealed for shipment with Polyken High Tensile Tape No. 360.



Polyken High Tensile Tape anchors steel feed rolls and sleeve parts for turning lathes inside cardboard cartons.

New Polyken High Tensile Tape slashes shipping costs for Hawker Manufacturing Company

The Hawker Manufacturing Company of Dayton, Ohio, knew they could save important money if their steel lathe parts could be shipped in cardboard cartons instead of wooden crates. The problem was to find a satisfactory way to close and reinforce these cartons.

They tried banding, but the bands cut or crushed the cartons. Besides, the banding was hard to handle, bulky to store, and its application demanded special tools. The high tensile tapes they tried didn't hold They split, rolled at the edges and didn't provide any resistance to weather.

Then Polyken introduced a new high tensile tape . . . the *only* high tensile tape with a plastic-coated cloth backing. Hawker used it, found it did the job with complete satisfaction.

Here's why new Polyken High Tensile Cloth-Backed Tapes can solve similar problems for you:

This is the only high tensile tape with non-split cloth backing—plastic coated to resist weather.

Excellent adhesive quality fuses tape to the carton without cutting or crushing—provides sure, lasting hold without creep or edge roll.

Application is fast—6 times faster than banding—and no special tools are needed.

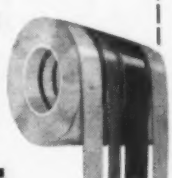
The tensile strength: 240 pounds per inch of width.

New Polyken High Tensile Tape is now available in Gloss Black, No. 360, for regular packaging applications and NON-STAINING Gloss White, No. 361, where a protection from staining is required.

This is just another example of the way business is finding new money-saving uses for the new Polyken tapes. Use the coupon for samples and complete information.

TAILORED TO YOUR JOB

Polyken®



INDUSTRIAL TAPES

Department of Bauer & Black
Division of The Kendall Company

Polyken Dept. IAF
222 West Adams St., Chicago 6, Illinois

For physical properties, samples and further information on Nos. 360, 361 and other Polyken Tapes, please send me your FREE BOOKLET, *Tape is a Tool.*

Name_____ **Title**_____

Company_____

Street Address_____

City_____ **Zone**____ **State**_____

Glossary

Continued

Effort Rating: See Rating.

Effort Time: Time during which effo is exerted.

Elapsed Time: 1. Total time take during a time study. 2. The tot time consumed from the beginnin to the end of any related pair predetermined start and end point 3. Actual expired time from start finish of an operation.

Element: A selected part of an opera tion of work cycle separated fo timing and analysis and for whic points of beginning and ending ar clearly defined and determined.

Element Breakdown: See Job Break down.

Element-Machining (Metal): A ma chining element includes only th time during which metal is removed The element starts with the firs contact between the tool and th work, and stops at the time whe the tool and work are separated Other work is excluded in machin ing-element time values.

Element Time: Time required to per form an element of work under a given incentive plan and conditions

Elemental Time Value: See Element Time.

Element of Work, Load: Starts with the beginning of the motion to pick up the part, and terminates with the removal of either hand from the activity that leaves the part in the working position. On very fast simple loadings, this portion of the cycle will be regarded as one element. However, where the loading becomes lengthy, and includes the use of clamps or other fastenings, a breakdown of the time into smaller elements may be sought.

Element of Work, Tool Adjust: Tool adjust usually includes two parts: tool adjust "to" and tool adjust "from." Tool adjust "to" begins with the termination of the loading element and ends with the beginning of the cutting or machining element. Tool adjust "from" begins with the termination of the machining and terminates with the beginning of the unload element.

Element of Work, Unload: The opposite of Load. See Load.

Empiric: A conclusion or solution based on practical experience.

Evaluated Rate: An hourly rate of pay determined by job evaluation procedures. A single rate in a wage class or labor grade. Sometimes used as the base rate for all incentive pay figuration for wage class or labor grade rate range work.

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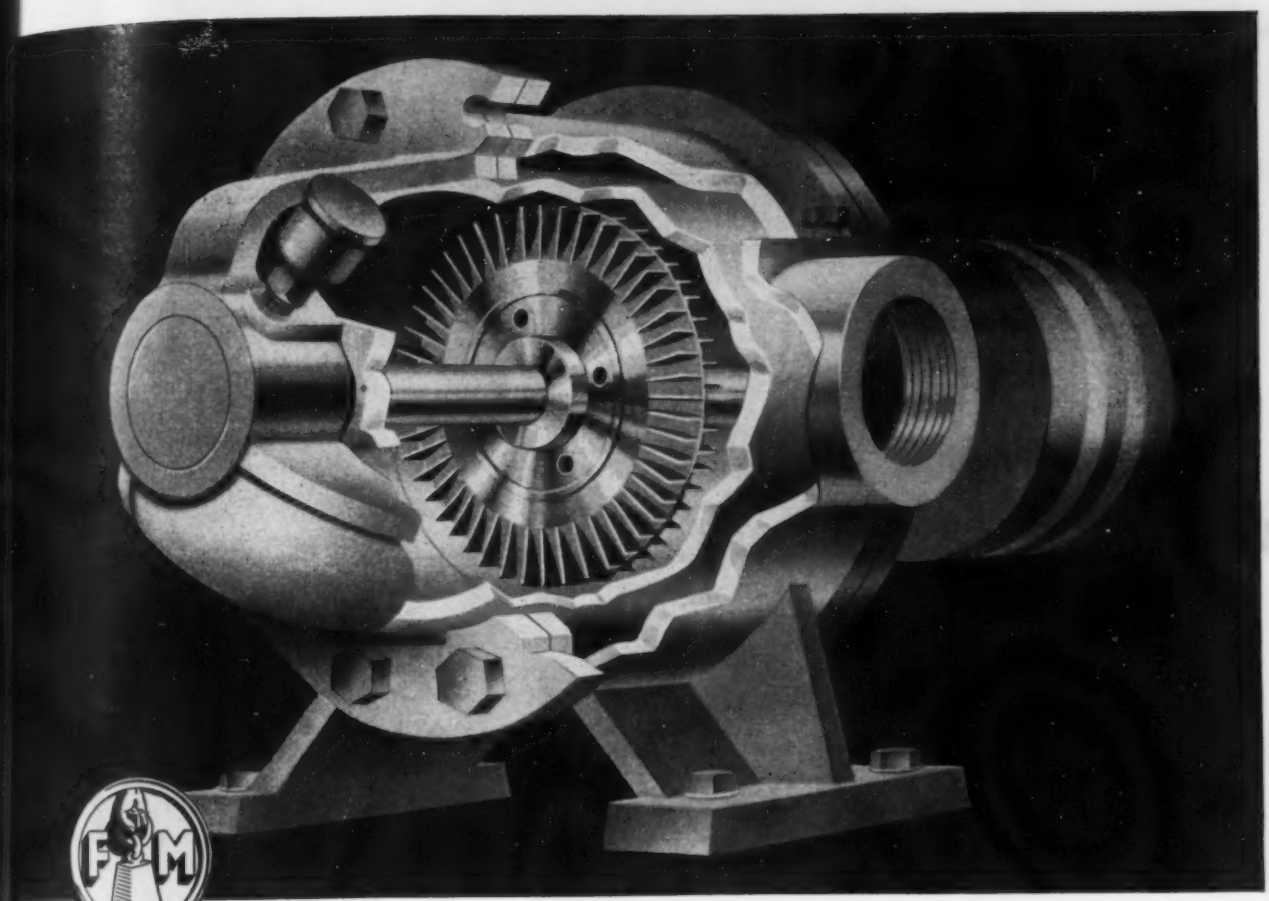

Its heart is its one moving part . . .

With castings in quality as well as in quantity, National Bearing Division helps its customers make better products.

When a leading pump manufacturer entrusts National Bearing Division with producing vital pump components, and producing them to the exacting standards required, there are some important reasons why.

This Fairbanks, Morse Turbine Pump combines high pumping efficiency with low pumping costs...thanks to close-fitting precision-machined bronze liners and impellers that are easily replaced on the job, at a big saving over new housings.

These castings—particularly the impeller—have to be "right"...free from blow-holes, sand inclusions...and must be exceptionally fine-grained. Otherwise lost machining time, before defects are found, can seriously increase production costs.

National Bearing Division was picked to supply castings for the very heart of this Fairbanks, Morse Turbine Pump...because of an often demonstrated ability to mass-produce non-ferrous castings to a high standard of uniformity and quality.

If your product requires non-ferrous components, it will pay you to investigate National Bearing Division. We have the foundry facilities and skills that can make important contributions to your product performance... with castings *in quality* as well as quantity. *The end result may well save you money, too!*

AMERICAN Brake Shoe COMPANY

NATIONAL BEARING DIVISION

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Glossary

Continued

Expected Earnings: Expected earnings are those earned at expected average incentive performance.

Experienced Employee: One who is thoroughly accustomed to the method of doing specified work so that he will perform each operation or motion in the prescribed method without hesitation or delay. Also see Qualified Operator.

Experienced Operator: See Experienced Employee.

External Elements: Necessary work elements which cannot be performed while the machine that is involved in the operation is producing.

External Time: Sum of the times of all the work elements that must be performed outside the machine time or machine cycle.

Fair Day's Work: The amount of work that can be produced during a working period or shift under a predetermined set of conditions by a qualified employee working continuously and consistently at a normal pace.

Fast Time: The time under some incentive plans in which the average employee working under incentive conditions is expected to complete an element or an operation. Such performance is rewarded by incentive premium of 20%, 25%, or 33⅓%, etc., depending on the local incentive plan. See "High Task" under Rating.

Fatigue Allowance: The percentage added to normal time to compensate for fatigue.

Feed: 1. The advance of a cutting tool per minute or per revolution of the tool or the work. 2. To furnish material to an operation by mechanical means or by gravity. 3. A device for feeding material to an operation.

Find: The element occurring after search and represents more of a mental reaction than a physical movement.

"First Piece" Time: Time required to produce the first piece of several. Usually includes setting of tools, adjustments, making of pieces until a satisfactory one is obtained, and inspection of piece. The exact meaning in terms of time may vary according to local usage under a given incentive plan.

Fixture: Often called a jig. A tool designed and used to hold one or more parts in correct position for satisfactory performance of work such as assembling, soldering, screwing, riveting, etc.

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26″ STRUCTURAL MILL

BUILT BY MORGAN Engineering

Illustrated is a 26″ Three-High Structural Mill, consisting of one 26″ Three-High Pinion Stand connected to two Three-High Roll Stands and one Two-High Pinion Stand connected to one Two-High Finishing Stand.

For serving this mill, there was furnished four Traveling and Tilting Tables and four Traveling Trailing Tables.

Your inquiries for mill equipment will be appreciated.

ESIGNERS • MANUFACTURERS • CONTRACTORS
LOOMING MILLS • PLATE MILLS • STRUCTURAL MILLS
ELECTRIC TRAVELING CRANES • CHARGING MACHINES
INGOT STRIPPING MACHINES • SOAKING PIT CRANES
ELECTRIC WELDED FABRICATION • LADLE CRANES
TEAM HAMMERS • STEAM HYDRAULIC FORGING PRESSES
SPECIAL MACHINERY FOR STEEL MILLS

THE MORGAN ENGINEERING CO.
LLIANCE, OHIO PITTSBURGH—1420 OLIVER BUILDING

Glossary

Continued

Flow: The rate, direction and/or manner in which material and/or product progresses from one operation to another in a manufacturing process.

Foreign Element: An interruption or delay occurring in the course of a time study on a repetitive operation, that is not a part of the regular cycle.

Gain Sharing: A form of financial incentive pay plan whereby the employees share in savings gained from an increase in production over a standard.

Gantt Chart: A graphical method of showing a plan in terms of time and on the same chart the accomplishment in relation to the plan.

Most frequent usage refers to a comprehensive and condensed graphic means for maintaining control of production. The charts make use of two fundamental factors in scheduling, dispatching, and control.
1. the item under consideration and
2. the element of time.

Get: The elemental motion in an operation which is involved in obtaining a part prior to use or process. The opposite of Dispose.

Grasp: The elemental hand motion of closing the fingers around a part in an operation. It begins when the hand or fingers first make contact with the object and ends when the hand has obtained control of it.

Group Incentive: A group incentive is any incentive applied collectively to two or more employees.

Group Piecework Plan: A group incentive plan in which payment is made on a piece work basis.

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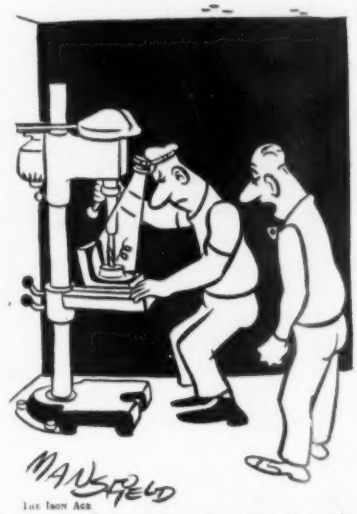


You win Jones. We'll put a light fixture here in your corner.

JOINING 1¼-in. thick phosphorized copper-plate bottom and shell, using ANACONDA Copper-372 Welding Rod and Aircomatic process. Grooves are angled 60° to 90°, root spacing 3/16 in. Welds made with four passes on one side, back chipping and one pass on other side.

UNUSUAL COPPER WELDING JOB—

1⅛-in. thick plates welded at high speeds

THIS was an unusual job for any metal fabricating concern. It involved four chemical process kettles formed from 1¼-in. phosphorized copper plate into shells 6 ft. in diameter by 3 ft. deep and fitted with reversed-dished bottoms 18 in. deep—the bottoms welded to the shells.

The welding process selected by The Ansonia Copper and Iron Works of Cincinnati, fabricators of the kettles, was the Aircomatic® process using ANACONDA Copper-372* Welding Rod in coil. At the start of each weld, the work was preheated to only 300 F. With a welding current of 400-500 amperes, the 1/16-in. and 3/32-in. welding rod was fed in at speeds up to 396 inches per minute.

The welding of copper plate of this thickness is exceptional. Conventional methods would have required up to 2½ hours per foot of joint, but with ANACONDA Copper-372 Welding Rod and the Aircomatic process these joints required only 13 minutes per foot.

Whatever type of welding business you are engaged in—fabricating, production or repair—there's a correct ANACONDA Copper or Copper Alloy Welding Rod for nearly every job. They are available from distributors throughout the United States. Publication B-13 tells about them. For your copy, write to *The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.*

*U. S. Patent No. 2,220,464 53159

HERE'S THE FINISHED WELD. ANACONDA Copper-372 Welding Rod was used because welds develop full strength of annealed base metal without costly hammering

braze or weld with confidence*—ANACONDA® *welding rods

Glossary

Continued

Guaranteed Base Rate: Used in conjunction with financial wage incentive plans. A minimum rate which is paid an employee as a guarantee when his production is below standard. Also paid for delay and non-standard work.

Guaranteed Earnings: The earnings guaranteed for attendance on the job regardless of performance attained.

Guaranteed Hourly Rate: The hourly rate of pay guaranteed for attendance on the job regardless of performance attained.

Guaranteed Standard: A time or production standard which is guaranteed against change by management irrespective of earnings unless there is a change in quality requirements, method, materials, tools, layout, equipment, feeds, speeds, designs or working conditions. Usually guaranteed against decrease of time.

Handling Time: Time required to transport parts either in bulk or otherwise for an operation to and from or at work station.

Hundred Per Cent Incentive: Incentive plan in which the per cent performance over standard is rewarded by an equal per cent premium over base pay.

Idle Time: An interval during which either man or equipment (or both man and equipment) does not perform work.

Incentive: An inducement either financial or non-financial for performance above some designated point or level generally called standard.

Incentive Earnings: The amount of money in excess of the guaranteed wages because of performance over standard.

Incentive Opportunity: Either the possibility, or lack of it, for an operator to accomplish incentive earnings.

Incentive Performance: Performance above standard when working under a wage incentive plan. Usually a higher level of performance than when working under hourly pay plans. Is characterized by a faster pace, less non-productive time, and better application to the job than performance under hourly pay plans

Incentive Plan: A plan in which a consideration, generally financial, is given for a performance at or above a designated point or level.

Turn to Page 174

Alemite Fights Friction
in $22 million hydro-electric plant!

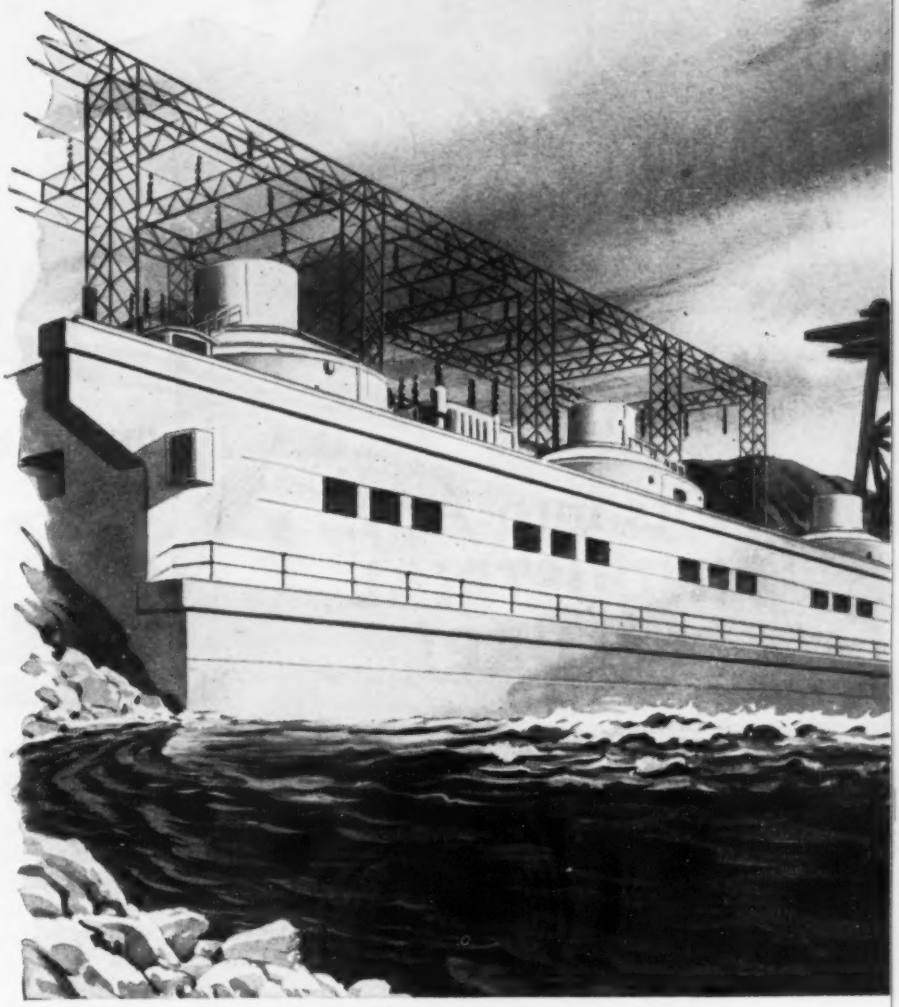
Protecting the Heart of an Industrial Giant with Alemite Centralized Lubrication

Rising 132 feet above the excavated Snake River Bed near Mountain Home, Idaho, stands the C. J. Strike Dam. Here, in the newest and largest of the Idaho Power Company's vast network of hydro-electric plants, giant turbines drive massive generators—convert billions of gallons of water into energy for man's needs.

It was vital that lubrication of this engineering colossus be safe, sure—absolutely dependable. The three huge turbines driving 30,000 kw generators required lubrication every four hours—*at 444 separate points!* Significantly, an Alemite Accumeter Lubrication System was chosen for this important work.

Throughout all industry—wherever metal touches metal—you'll find Alemite systems on the job. Boosting production, cutting costs. Giving power, precision and smooth-as-velvet performance to a world in motion.

Alemite lubrication engineers can help you save. For further information, contact your Alemite distributor. Or send for free, informative booklet, "11 Ways to Cut Production Costs." Just mail the coupon below—today.



Alemite—Greatest name in lubrication —serves the greatest names in industry

The same safe, sure method that every day lubricates billions of dollars worth of industrial, farm, marine and aviation machinery can protect *your* plant equipment against the ravages of its number one enemy—*friction!* Here are but a few of the industrial leaders who rely on Alemite . . .

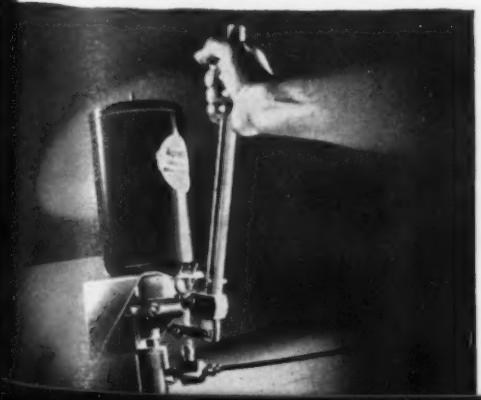
The Timken Roller Bearing Company
Celanese Corporation of America
Minneapolis-Honeywell Regulator Company
Republic Steel Corporation • Link-Belt Company

A PRODUCT OF SW STEWART WARNER

ALEMITE

REG. U. S. PAT. OFF.

35 Years of Lubrication Progress



Alemite Accumeter Systems permit automatic lubrication . . . uninterrupted production

From one central point, Accumeter automatically measures and delivers lubricant to *all* bearings—while the machine is in motion! Does it in a fraction of the time required for hand-gun lubrication. No downtime . . . no points missed!

Please send me **FREE** *New Booklet*

☐ "11 Ways to Cut Production Costs"

☐ Include facts on **Accumeter**—Alemite's amazing lubrication system that lubricates while machine is in operation.

Alemite, Dept. N-63
1850 Diversey Parkway, Chicago 14, Ill.

Name .....

Company .....

City ..... State .....

Glossary

Continued

Indexing: Rotation or movement of work or tool from one working position to the next desired working position accomplished either by hand or automatic means.

Indirect Labor: Work in connection with production which, however, does not change the quality or form of processed parts.

Industrial Engineer: An industrial engineer is a person who by virtue of training and experience in the fundamentals of engineering as well as in the techniques and philosophy of scientific management uses a fact-finding, analytical approach to the solution of management problems having to do with methods, systems, standards, controls and human relations so that operations within an organization may be maintained at a high level of productivity and with low cost.

Industrial Engineering: Industrial engineering is the application of engineering knowledge and techniques to the study, improvement, design and installation of: 1. methods and systems. 2. standards including quantity and quality measurements as well as organizational and operating procedures. 3. controls whereby performances are measured against standards, followed by appropriate action, all with due regard to the well-being of employees, to achieve better management chiefly in, but not limited to, industrial enterprises to the end that improved products and services may be had at lower costs.

Inherent Delay: A delay that is part of a job method. May be delay caused by automatic machinery controlling a portion of a job cycle, one hand waiting for the other hand to allow it to work, or one employee waiting for another to perform work which governs subsequent work in a line of operations.

Unavoidable delays that are representative of the normal job conditions.

Inspect: Often an element included in an operation in order to assure acceptable quality through a regular check by the employee performing the operation.

Instruction Card: Instructions furnished an employee which list procedure to be followed in performing a task, the tools and equipment to be used, feeds and speeds to be used, etc. Written Standard Practice for an operation.

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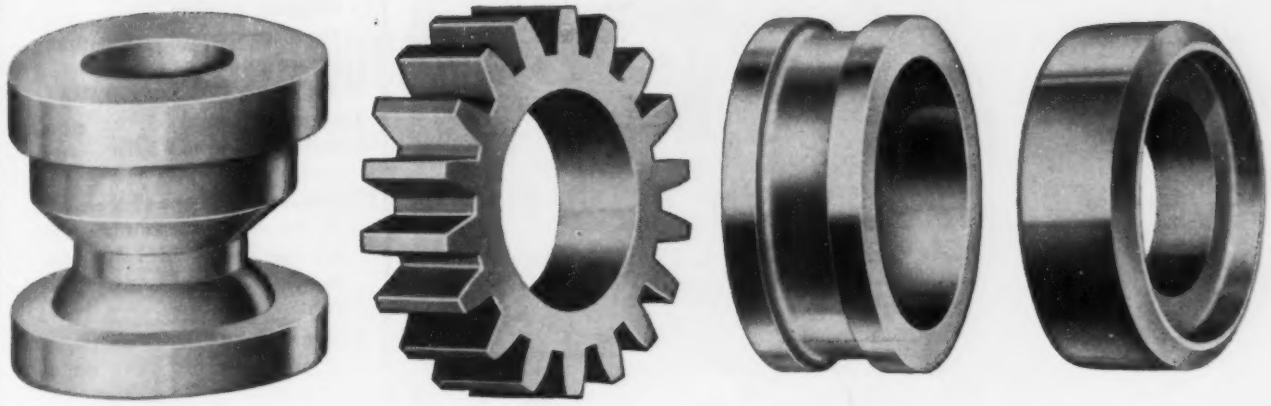
If you make hollow parts



why pay top price for the holes?

HERE'S a way to save on the cost of the holes in your hollow cylindrical parts. Use Timken® seamless steel tubing. The hole is already there! You eliminate drilling, usually go right into finish boring as your first production step. You machine less metal, get more parts per ton of steel. And the screw machine stations normally used for drilling can be released for other jobs.

And the Timken Company's tube engineering service helps you save even more steel! It recommends the most economical tube size for your job—guaranteed to clean up to your finished dimensions.

You also get fine forged quality in Timken seamless steel tubing. The piercing process by which it is made is basically a forging operation. It gives the tubing a uniform spiral grain flow for greater strength, and a refined grain structure which brings out the best in the quality of the metal. And due to the Timken Company's rigid quality control, this quality is uniform from tube to tube and heat to heat. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

Fine Alloy

STEEL

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

Glossary

Continued

Interference Time: Interference time is the time lost where one or more machines in a given assignment are stopped waiting for service, while the operator or operators are servicing other machines within the assignment.

Internal Element: 1. An element of work performed by a machine operator while the machine is performing its share of the work cycle. 2. An element of work performed by one hand while the other hand is performing a long element which controls the work cycle.

Internal Time: The machine-controlled or process-cycle time which could be or is used by the operator.

Also, can mean locally the sum of the times of all the work elements that can be performed by an operator during the machine time or machine cycle.

Irregular Element: An element which does not occur regularly in each operation cycle. It may repeat periodically or at irregular intervals and is necessary when it occurs in the production of the part.

Isometric Drawing: Three-dimensional drawing often used in methods presentations to give visual idea of workplace, tooling, assemblies, etc.

Jig: Often called a fixture. A tool designed and used to hold one or more parts in correct position for satisfactory performance of work such as assembling soldering, screwing, riveting, etc.

Job Breakdown: A listing of the content of a job by its elements, components, or Therbligs.

A listing and description of the parts of a job by elements, components or Therbligs.

Job Description: Description of an occupation used for job evaluation or classification purposes; also for selection and placement of employees in positions or jobs.

Joint Study: 1. A simultaneous time study by two or more persons. 2. A time study conducted jointly by union and management to ascertain facts in a dispute over an incentive standard.

Labor Productivity: Labor performance or output. Changes are measured against a standard or index of a stated base period.

Levelling: See Rating.

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PYLE NATIONAL INCREASES PRODUCTION 47%!

Soldering Of Spring Assemblies Speeded By *LINDBERG* Induction Heating Unit

An hourly production increase of 47% . . and a per-operator production increase of 330% through the use of a Lindberg Induction Heating Unit! These are the money saving facts and figures reported by Pyle National Co., Chicago manufacturer of electrical components.

The company uses a 10 KW Lindberg unit for the production soldering of flanges to coil springs in the manufacture of torsion spring assemblies. The time cycle is 11 seconds for each assembly.

Production has been increased to 125 assemblies an hour . . with one girl operating the equipment. This is an hourly increase of 40 assemblies over the former method where soldering was done by a team of three men using gas torches. And the hourly per-operator production is up from 28 to 125!

With the induction heating unit, there are no open flames from gas torches. No extra exhaust fans are required . . there is little danger of burns to operators . . fire hazards are virtually eliminated!

And there is a substantial economy of floor space! Formerly the three torch operators required more than 60 square feet of floor space . . but the Lindberg Induction Heating Unit requires less than 30 square feet.

If your requirements call for production soldering, brazing, hardening, annealing, stress relieving, hot forming, forging or shrink fitting, investigate Lindberg Induction Heating Units. Ask for Bulletin 1440.

LINDBERG

HIGH FREQUENCY DIVISION

LINDBERG ENGINEERING COMPANY,
2441 West Hubbard Street, Chicago 12, Illinois

Glossary

Continued

Loose Standard: A standard that yields incentive earnings in excess of those warranted by the performance.

A standard in which an incentive employee is consistently able to attain earnings that are excessive in relation to the skill and effort applied.

Machine Attention Time: That time during an operation in which an operator has no physical work to perform, but yet must be attentive to observe machine operation, await a signal, or ready himself to perform some task at a certain phase of the operation.

Machine Controlled Time: See Controlled Machine Time.

Machine Cycle: That period which an automatic machine takes to complete an operation.

Machine Down Time: 1. The time a machine is out of operation and waiting to be serviced. 2. Also, may be locally defined as the portion of time during the total time to produce one unit of work, during which the machine is not running.

Machine Element: An element wherein a machine produces work without simultaneous manipulation by the operator.

Machine Idle Time: Time in which machine is not operating for any reason.

Machine Time: That part of the operation cycle in which the machine operates and is at work on a part.

Make-up Pay: In wage incentives, means the wages paid to an incentive employee, who has failed to earn his guaranteed base rate, which bring him up to the guarantee. Make-up pay is equal to the difference between the employee's incentive earnings and his guaranteed earnings.

Make-up Time: The difference between standard hours paid for and those actually earned under a wage incentive plan with a guaranteed minimum wage.

Man-Hour Output: Output expressed in units of output per man hour.

Manit: A unit of work measurement under some incentive plans.

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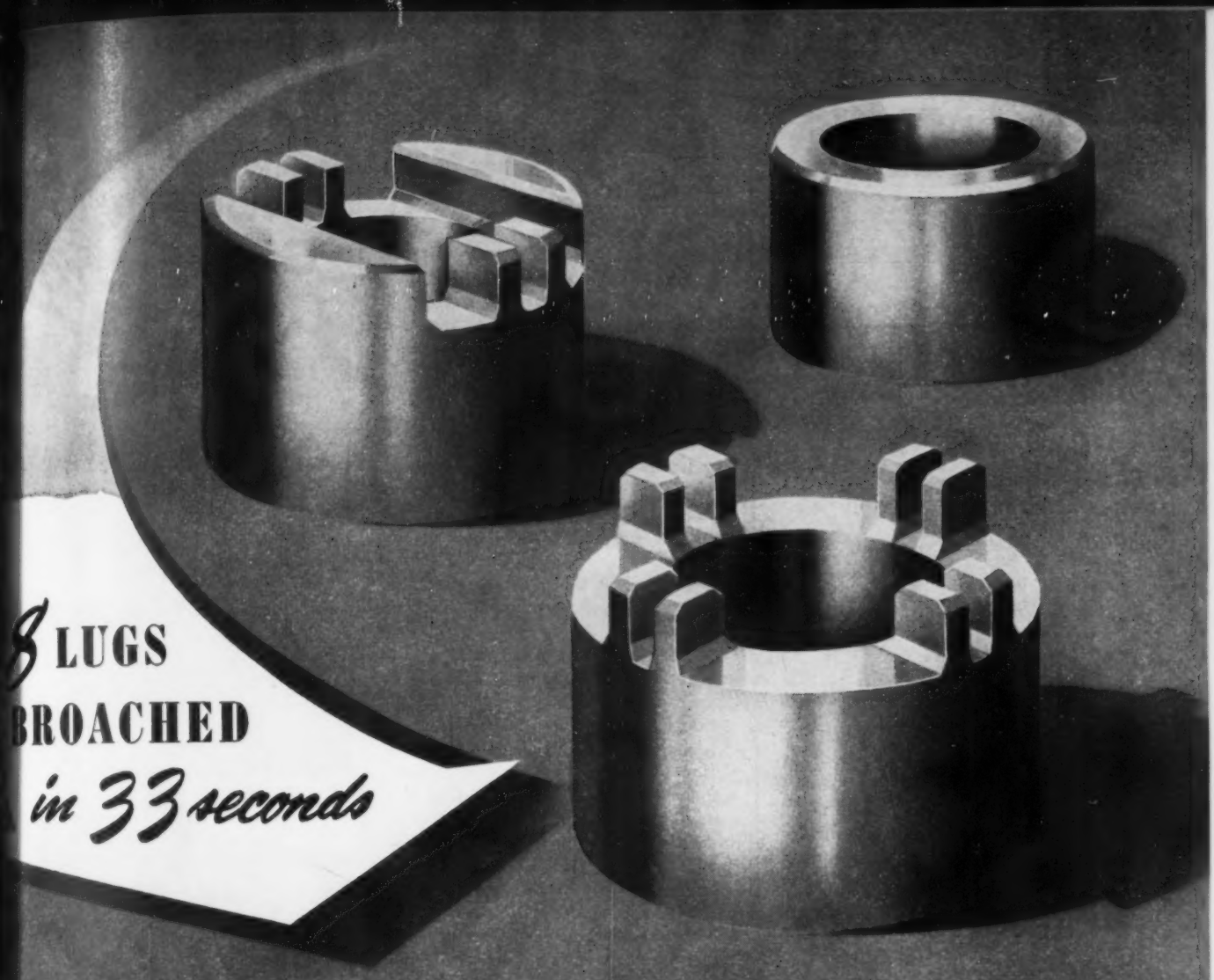


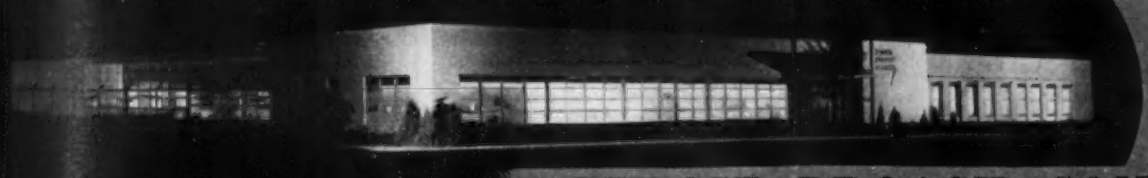
To produce eight single lugs on the end of a steel sleeve was a problem recently given to Detroit Broach.

After analysis of the operation, Detroit Broach recommended a single ram vertical surface broach to do the job. One of the problems within the job, in addition to increasing output, was the necessity of holding a close tolerance between the lugs.

The vertical broaching machine was set up with a two-station fixture which power-clamps the parts. A single pass of the broach forms four lugs across the sleeve. The sleeve is then indexed 90° and the other four lugs are formed. Complete cycle time—33 seconds per completed part. Slot tolerances are easily held and surface finish on the lugs requires no additional machining.

This is just typical of the specialized broaching techniques evolved by Detroit Broach for leading manufacturers. You, too, may have an application that can be materially reduced in time or cost by the economy of broaching or by review of present broach tooling. It will pay you to consult Detroit Broach for engineering or production data.

WORLD'S LARGEST MANUFACTURER OF BROACHES AND BROACHING TOOLS EXCLUSIVELY



DETROIT BROACH COMPANY

20201 SHERWOOD AVE. • DETROIT 34, MICH.

—Glossary—

Continued

Manual Element: An element of an operation wherein physical effort is exerted to perform useful work.

Marstochron: An electrically driven timing instrument used in time studies on fast operations that are short. It contains a tape on which marks are made by the observer by pressure on a key. The tape is calibrated in terms of time units and can be studied after the actual time study.

Maximum Performance: The highest level of attainment possible by a highly skilled operator using the proper method, under ideal conditions.

In general the greatest quantity, amount or degree of work that can be produced.

Also, highest output rate attainable or expected to be attainable.

Measured Daywork: 1. A type of wage plan based upon fixed minimum hourly rates of pay, sound production standards, and employee productivity records. Periodically the employee's average productivity is reviewed and for the following period he may receive none, more, or less extra pay above the minimum rate in accordance with a pre-established relationship between productivity and extra pay. 2. Also means locally, a measurement of labor performance without provision for incentive payment.

Memomotion Study: A special motion and time study application of the motion picture camera, used to record and measure interrelated events. Pictures are taken at an unusually slow speed.

Method: A procedure for doing work.

The work pattern used in processing; the way of doing; that combination of set-up, lay-out, and/or prescribed way of doing.

A given "Method" is established by fixing the nature and sequence of the major task. The method is recorded by defining the work elements, the sequence of the elements, the manner of performing the elements, the working conditions affecting the elements, and the facilities used to accomplish the elemental work units. Any action which changes the nature of the work elements recorded for a "Method," or changes the sequence of the elements, or alters the equipment used to perform the elements, or affects the manner of performance, results in a change in the "Method."

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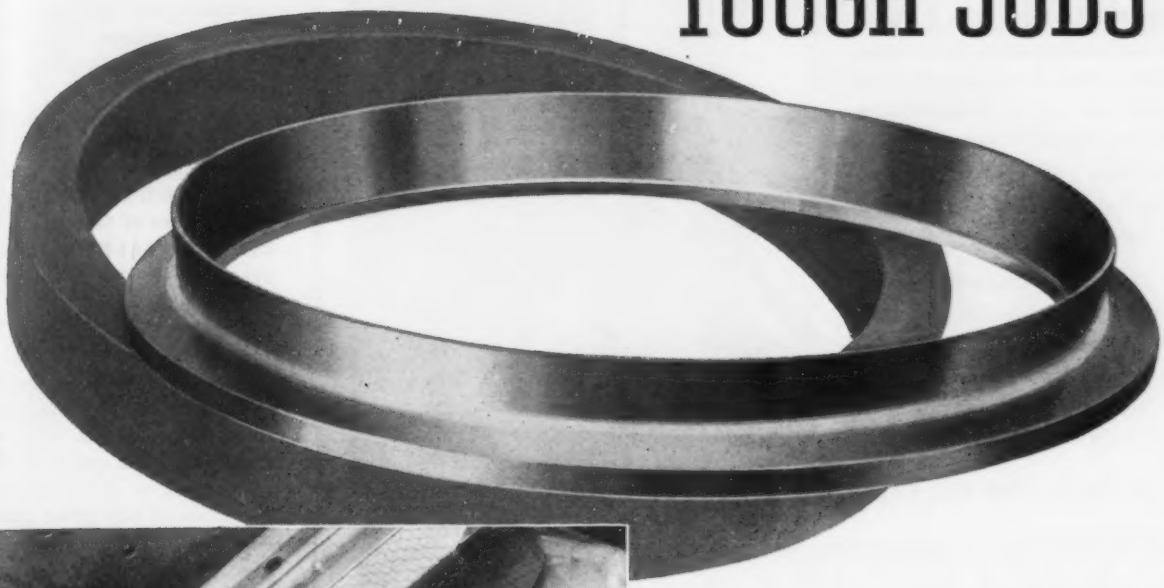
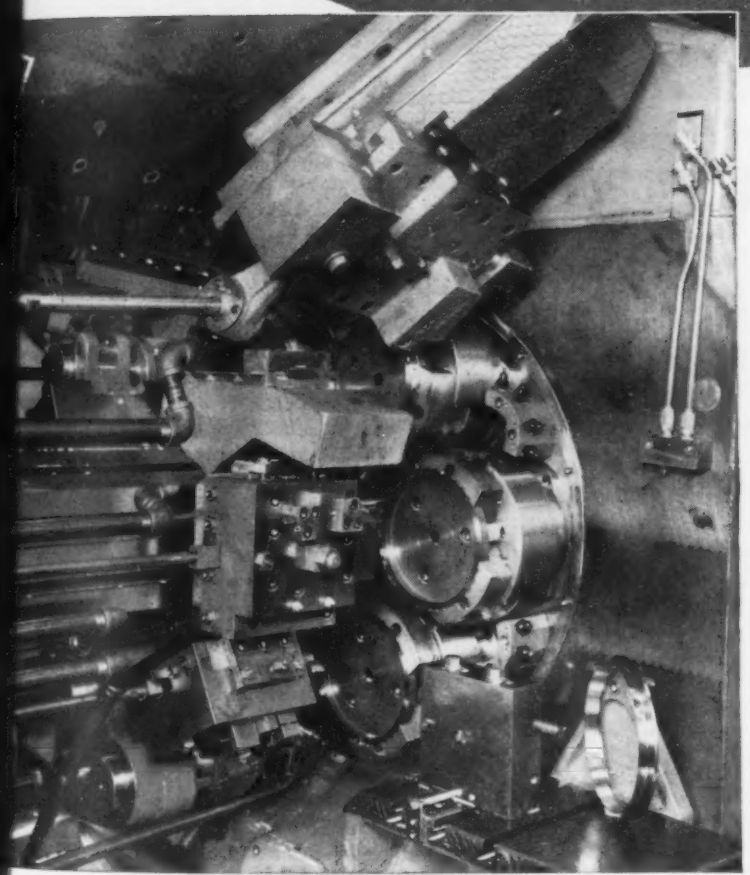
ACME-GRIDLEY CHUCKERS take the TOUGH JOBS





This 8″ Combustion Chamber Flange for jet engines is no job to be fooled with.

Machined from 8″ diameter stainless steel blanks as shown, it presented first the problem of removing a lot of metal FAST—321 stainless is a difficult metal for precision results.

Tooling for accuracy and finish included both roughing and finish taper turning and boring attachments for the special angles and for holding the thin wall within .008 without danger of collapsing the piece.

All 13 operations were performed on the 10″ Acme-Gridley Model RPA 6-spindle fully automatic Chucking Machine with carbide tipped tools at a net output rate *more than 6 times faster* than was possible on the turret lathe method formerly used.

Performances like this have demonstrated to the owners of more than 45,000 Acme-Gridley bar and chucking automatics that design rigidity and tooling ingenuity are your best insurance for sound production and profitable end results.

Acme-Gridley Chucking Automatics are built in 4, 6 and 8-spindle models with capacities ranging from 5¼ to 12″.

★ **Ask for guaranteed figures on your work—Tough jobs or otherwise.**

JOB FACTS:

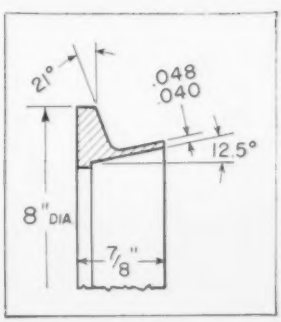
PART—Jet Combustion Chamber

SIZE—8″ Diam., ⅞″ long

MATERIAL—Type 321 Stainless Steel

OPERATIONS—13, all with Carbide Tools

MACHINE TIME—1 minute, 16 seconds



The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics, 1-4-6 and 8 Spindle —Hydraulic Thread Rolling Machines—Automatic Threading Dies and Taps—Limit, Motor Starter and Control Station Switches—Solenoids—Contract Manufacturing.

—Glossary—

Continued

Methods Engineer: One versed in the analysis of methods and the development of new methods. One who analyzes the way things are done with the purpose of finding the easier and better way to accomplish a given result.

One who develops improved methods of doing work.

Methods Engineering: The analysis of the way things are being done for the purpose of finding an easier and better way of accomplishing a given result. The art of analyzing and improving methods.

The application of analytical techniques to the development of improved methods of doing work.

Methods Study: The analysis of practices, including motions, materials, and workplace, and tools and equipment used, or to be used in the performance of any given task.

Methods-Time Measurement MTM: A procedure which analyzes any manual operation or method into the basic motions required to perform it and assigns to each motion a predetermined time standard which is dependent on the nature of the motion and the conditions under which it is made.

Microchronometer: A dial timing device placed in the field of view to indicate time intervals. It is used when a record of time is desired in conjunction with the motion pictures of an operation

Micro-Motion Study: The study of the fundamental elements or subdivisions of an operation by means of a motion picture camera and a timing device which accurately indicates the time intervals on the motion picture film.

Minimum Time: The acceptable lowest time shown for a series of readings during a time study of a specific work element. Not necessarily the shortest time recorded. Is used to estimate earnings or performance possibilities under an incentive standard.

Modal Selection: The actual elemental time selected from time study recordings as determined by using the reading occurring most frequently in one elemental series of readings.

Motion Analysis: The division, analysis and study of each motion used in an operation with a view to improving the operation as a whole.

The methods study through which standard time can be determined by using body member movement time

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Weirzin

ELECTROLYTIC ZINC-COATED STRIP

Cuts manufacturing costs!

- Speeds production
- Increases die life
- Reduces die maintenance

From the first day you use Weirzin you will find a marked reduction in manufacturing costs. Your production rate will increase with less time spent on die maintenance and replacement. The tight zinc-coating, electrolytically applied to Weirzin steel, actually lubricates dies without leaving a zinc deposit—thereby reducing die maintenance expense and lengthening die life.

One fabricator reported a 300 per cent increase in production per set of dies after changing to Weirzin from ordinary carbon steel. This is an economy factor too great to be ignored.

Add to this the fact that the zinc coating on Weirzin will not flake, peel or powder under the most severe fabricating operations and you will quickly realize what production economies Weirzin has to offer. Write today for further information on how Weirzin can cut your manufacturing costs—and make your product a better one.

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

NATIONAL STEEL CORPORATION

NATIONAL STEEL

WEIRTON STEEL COMPANY

and a closer control of loss and waste in an existing method.

Motion Study: See Motion Analysis.

Multiple Time Plan: Payment of varying day work rates for varying levels of productivity. In practical effect it consists of a series of step bonuses.

Nomograph: A graphical and time saving means of solving repetitive problems that involve common variables. Alignment charts.

Non-Cyclic Element: A necessary work motion or interruption that occurs at varying or constant intervals during the series of cycles.

Non-Cyclic Time: The time for a non-cyclic element.

Non-Productive Labor: See Indirect Labor.

Norm: A set standard of achievement or output.

Normalize: See Rating.

Normal Operator: A qualified operator working at normal pace.

Normal Pace: The pace of a qualified operator working at normal tempo. Certain standards or bench marks for judging normal have been widely accepted.

Normal Performance: The performance of an operator who is considered to be working at a normal pace in relation to a set standard of pace.

Normal performance is sometimes defined. One such definition is: Walking three miles per hour over smooth level ground without load.

Normal Time: The time required under standard conditions to perform work at normal pace but without including allowances.

Observation: In time study, means the act of observing and recording the time required for an element in a time study.

Observation Form: See Time Study Sheet.

Observation Period: The entire period of a single time study commencing with the instant the watch is started and ending with the completion of the study when the watch is stopped.

Observer: One who observes an operation for the purpose of making a time study and recording factual data pertaining to the operation.

Occupational Rate: The straight time hourly rate of pay for an occupation, usually established by job evaluation.

Occupational Wages: The straight time average hourly earnings on an occupation.

Occurrence: 1. The number of times an element normally occurs in a cycle. 2. The number of times a non-cyclic element is repeated in a time study.

Operator: A general term used to designate a production employee.

Operation: A specific direct labor task toward a specific end. Work done in the conversion of material at some specific step or in its entirety. Can also be an indirect task in factory or office such as cleaning and tabulating.

In time study and wage incentives, is the smallest unit of work for which an incentive standard is established. It is made up of several related elements of work which performed in sequence constitute the cycle of the operation. An operation generally converts or changes material or conditions from one state to another to add value to products.

Glossary

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Operation Analysis: Study of the component parts of an operation. The object is to determine where and how to improve the operation.

Operation Card or Sheet: 1. A record card describing the work to be performed on an operation, the tools to be used, the method to be followed and time allowed. It frequently but not always performs the function of an instruction card. 2. Also, can be locally a form containing the list of operations necessary to complete a product, together with such other information as may be required by the product in question.

Operation Element: See Element.

Operation Flow Chart: A chart utilizing symbols and flow lines to make a visual representation of a sequence of operations. Frequently time values and distances traveled and other pertinent facts are indicated.

Output: The quantity which is produced.

Output Standard: See Standard.

Over-All Study: A rough time study of the entire cycle of a specific job with no regard to a breakdown of its various elements, used chiefly for delay analysis or to check job standards when employees claim the time allowed is inadequate.

Overtime: Working time spent in excess of a prescribed and agreed regular work-day or work-week; usually time for which premium or base pay is paid to an employee because of excess and/or inconvenient hours worked.

Pace: See Performance.

I'm for buying 'em—even if they do make the rest of our equipment look sickly and antiquated.

Pace Rating: See Rating.

Performance: 1. In time study and wage incentive, performance is the accomplishment of work to which measurement is applied. 2. Ratio of the standard time produced to the actual time on standard. 3. The effective effort of an employee being time studied.

Performance Efficiency: The quotient found by dividing the time allowed by the time taken. The result is expressed as a percentage. Thus, if a time study shows that the workman took 6.50 hours to complete a job and the standard allowed time is 8.25 hours, the performance efficiency of the workman would be 1.27 or 127%. May be applied to a group of jobs and to a department or whole plant. Could be expressed locally in various manners.

Performance Rating: See Rating.

Performance Rating Factor: A numerical rating assigned by the time study observer to the observed effective effort of an employee in terms of normal performance.

Performance Standards: See Standards.

Personal Allowance: Addition to normal time to compensate for the time required for personal needs.

Personal Rating: A qualitative rating for the purpose of establishing an individual employee's worth.

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Glossary

Continued

Piece Rate: The price per unit of production paid to an employee under piece work incentive plans.

Piece Rate Earnings: The gross earnings from piece rates exclusive of adjustments, downtime, overtime, and fringe benefits, paid any particular operator under a piece rate plan. Found by multiplying actual production by piece rate per unit.

Piece Rate Plan: A wage incentive plan with standards expressed in money per unit produced. Minimum wages per unit of time or per assignment are guaranteed under present practice.

Piece Work: Work done by the piece for a rate per piece. This is one form of wage incentive.

Piece Work Earnings: See Piece Rate Earnings.

Piece Work Plan: See Piece Rate Plan.

Piece Work Rate: See Piece Rate.

Piece Work with Base Guarantee: An incentive payment plan with the assurance to the employee that earnings will not be less than a specified amount if piecework earnings are not equal to the guaranteed amount. The guaranteed amount must at least be as high as that guaranteed by law.

Piece Work without Base Guarantee: A plan not in use at present because of minima prescribed by law, in which an operator is paid earnings as determined by the current piece work rate multiplied by production.

Point: Arbitrary value assigned to factors in some job evaluation plans to facilitate classification of jobs into pay grades (Job Evaluation). A unit of work measurement that is used in some wage incentive plans which relates performance to one normal minute's work (Wage Incentives).

Point Plan: 1. A wage incentive plan which relates performance to a common denominator of points of work and where sixty points generally represent one hour of work at normal. 2. A job evaluation plan in which points are assigned to various factors and totalled to establish the job grade according to a scale of points and labor grades.

Position: In methods and time study is an element of work consisting of locating an object in such a way that it will be properly oriented in a specific location. The motion performed in placing something in an exact and predetermined location in relation to something else.

Potential Earnings: 1. The expected maximum earnings of an employee under an incentive plan. 2. Also means locally the expected earnings at expected average incentive pace.

Pre-position: An element of work which consists of positioning an object in a predetermined place in such a way that it may be grasped in the position in which it is to be held when it is needed.

Process: 1. An operation or succession of operations leading to a result. 2. To subject something to treatment according to a plan.

Process Chart: A graphical device for depicting a process so that it can be visualized more readily and thereby understood.

Production: 1. The activities and functions required in the conversion of material in accordance with intent, by the use of tools, machines, equipment, and labor. 2. Quantity of a product produced in a given period.

Production Slip or Report: A form used to report facts concerning individual or group production, type units produced, machine number, downtime. Wage incentive earned is often calculated on such forms.

Production Standard: See Standard.

Production Study: A continuous time study usually taken for a period of one or more work shifts on an operator or group to determine the actual amount of pieces that can be produced for the period, taking into consideration effective effort applied, lost time, delays, interruptions etc. This type of study is usually made to check a previously established standard.

Production Unit: 1. The measure of a product such as ton, pound, dozen,

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LUTHER SCHEFFEY — THE IRON AGE

I got the idea from a magazine ad. Ought to cut our shipping costs to the bone.

gallon, piece, etc., which indicates and serves as a basis for production figures and records. 2. A term to describe the equipment and crew used to perform a given task.

Productive Labor: See Direct Labor.

Productive Time: The amount of time used in accomplishing useful work.

Productivity: 1. Actual performance as compared with expected or standard performance or with a base period. 2. Actual performance in output per unit of time.

Qualified Operator: An operator who has acquired a specified level of skill. A term used in wage incentives to indicate the type of individual who will be capable of functioning satisfactorily and earn expected incentive pay under an incentive plan when he is properly motivated.

Rate Cutting: A term having somewhat evil connotations because of past history. It is often used loosely by employees and unions to describe any situation where a standard is changed to require more production per employee per unit of time. Such a change may be justified by improved job conditions and methods.

Rate Setting: Determining a piece rate of a time standard. The use of this term is discouraged by some authorities because it is often confused with Wage Rate.

Rated Average Elemental Time: The average of elemental observed time leveled by applying a rating factor.

Rated Selected Elemental Time: Selected elemental time leveled by applying a rating factor.

Rating: Rating is that process during which a time study engineer compares the performance or effective effort of the operator under observation with the observer's own concept of proper performance as compared to a bench mark. The SAM performance rating films are an example of such a bench mark.

Generally involves the application of a numerical factor. Synonymous terms are Effort Rating, Pace Rating, Levelling, Normalize, Performance Rating, Speed Rating.

There are two general broad techniques of rating used, namely, "Task" and "High Task."

"Task" rating is used where the time study man compares the performance or effective effort of an operator with his own concept of normal performance or a break-even pace to earn the base rate of the job. This is sometimes known as "Low Task."

"High Task" rating is used where the time study man compares the performance or effective effort of an operator with his own concept of normal incentive performance or the incentive pace necessary to earn the expected potential incentive. When using the "High Task" levelling technique a potential incentive allowance is sometimes added to the leveled time, thus bringing it up to the "Low Task" time.

A time study man's concept of normal under either of the above methods is the result of his training and experience.

Reading Point: See Breaking Point.

Recorded Time Value: Under administrative practice in some incentive plans, a time value established for an operation and accepted by the employee becomes a recorded value after the first payment to the em-

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The difference between Life... and Death...

"Why should you give blood? Ask me—I ought to know. I fought in Korea. But since then I've been through the biggest battle of all—the battle for life itself. And it was blood—and blood alone—that saved me. Don't know when I'll be in a position to start repaying my debt by giving some blood of my own. But I will—some day. You can count on it!"

All kinds of people give blood—for all kinds of reasons. But every reason for giving blood is a *special* reason . . . just as every American life that can be saved at any time and at any place . . . is special. So whatever *your* reason for giving blood, this you can be sure of: Whether it goes to a combat area, a local hospital, or for Civil Defense needs—this priceless, painless gift will some day save an American life!

Give Blood Now

CALL YOUR RED CROSS TODAY!

NATIONAL BLOOD PROGRAM

Business Executives!

✓Check These Questions!

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ☐ Have you given your employees time off to make blood donations?
- ☐ Has your company given any recognition to donors?
- ☐ Do you have a Blood Donor Honor Roll in your company?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed employees of your company's plan of co-operation?
- ☐ Was this information given through Plant Bulletin or House Magazine?
- ☐ Have you conducted a Donor Pledge Campaign in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?

Remember, as long as a *single* pint of blood may mean the difference between life and death for *any* American . . . the need for blood is *urgent!*

Glossary

Continued

ployee is completed. The time value, after becoming a recorded value, is permanent so long as methods, materials, manufacturing facilities, or other conditions which affect the time remain unchanged.

Regular Element: An element that occurs in each complete cycle or is in the operation each time a part is produced.

Relaxation: In time study and wage incentive usage means the percentage added to normal time to compensate for fatigue. Sometimes this also includes personal time.

Release Load: A basic element used to describe the relinquishing of control of an object.

Re-operation: The reworking of a piece to remedy some defect in the first working.

Required Idle Time: 1. That time during which the employee can perform no work, is not required by operations in progress to be attentive to the process, and may relax or await a signal. Compare Machine Attention Time. 2. Time required to balance an operation on a production line using the time for the controlling operation as a basis.

Restricted Elements: Work elements that are governed by a machine or other cycle as to speed and on which the opportunity to make incentive earnings is constant when requirements are fulfilled. Compare Controlled Machine Time.

Restricted Job: 1. A job on which the work of the employee is subject to equipment, process or other operation limitations. 2. A job in which the nature of the operation limits the performance of the operator.

Restudy: See Check Study.

Retime: See Check Study.

Revolutions Counter: A device which records the revolutions of any part, frequently a shaft. It is actuated by the revolving part against which it is held.

Routing: A sequence of operations required to fabricate a part.

Saving: In methods, time study, and wage incentives is the difference between cost per unit before and after an event. The event may be the installation of wage incentives, introduction of a new method or machinery, etc.

Search: The basic operation element employed to locate an object.

That part of the cycle during which the eyes or hands are groping or feeling for the object.

A combination of eye and hand

movements to designate the action of locating an object.

Selected Average Time: See Averaging Selection Method.

Selected Elemental Time: That time chosen from the observed element times for a part of a work cycle, that is representative of the performance rating.

Selected Time: See Selected Elemental Time.

Simo-Chart: Abbreviation for Simultaneous Motion-Cycle Chart.

A graphic representation of the basic motions used in performing an operation, with the right and left hands shown separately, and with the time for the performance of these motions shown.

Slip Stick: A Slide Rule.

Snapback Watch Reading: A stop watch reading obtained by starting the watch hand at zero at the beginning of each element, reading the observed time at the end of the element and snapping back to zero.

Special Time Allowance: A temporary time value to compensate an operator for a specific non-standard condition which temporarily exists in an operation. It is given for a specified period and/or condition.

Speed Rating: See Rating.

"Speed Up": The term frequently is used loosely to describe increases in production for reasons unrelated to required increases in employee effort. Such reasons may be due, for example, to changes in layout and equipment. The term has had a bad connotation because of past practices.

Standard: A unit of measurement expressing a desired level of performance which it is necessary to attain under a wage payment or other

Turn Page

"Keltmeier!! Is that my crescent wrench you're using?"

Glossary

Continued

plan. May be expressed in various ways according to local requirement and usage: Standard time per piece, allowed hours per 100, pieces per hour, etc. Same as Production Standard, Output Standard, Performance Standard.

Standard Allowance: The allowance that covers conditions normally associated with the job under consideration. A fixed allowance made by type of activity.

Standard Allowed Time: See Allowed Time.

Standard Conditions: These obtain where significant items such as tools, feeds, speeds, quality, lighting, material, and other factors affecting an operation are those used as the basis for setting consistent standard times.

Standard Cost: The normal expected cost established for comparative purposes.

Standard Data: The consolidation of tables, charts, and element data into a single source for use in predetermining operation standards. May include instructions.

Standard Hour: The average amount of work a qualified operator working at normal pace under standard conditions can produce per hour over a day.

Standard Hour Plan: A wage incentive plan with standards expressed in standard hours per unit of production. Earnings are computed by multiplying standard hours produced by an hourly rate. There is a guarantee of actual hours at the hourly rate if standard hours are less than actual hours.

This is sometimes called Allowed Hour Plan.

Standard Hours Produced: Determined by multiplying items of production by appropriate standards and totaling the products.

Standard Practice: Established procedure for the carrying out of various activities or duties.

Standard Time: See Allowed Time.

Standard Time Data: See Standard Data.

Standard Time Formula: A compilation of "constant elements" and "variable elements" for a given product or class of work from which allowed time may be determined by substituting known factors in a mathematical expression.

Standardization: The process of establishing uniformity of conditions and methods under which a task is performed.

Glossary

Continued

Starting Rate: The beginning or hiring rate for a particular job classification.

Step Bonus: A wage incentive plan in which the rate of return to the employee per unit produced advances in one or more steps with increases in the level of performances.

Stop Watch: A watch which may be started or stopped at will and which has a large sweep hand for reading of small increments of time.

Straight Selected Time: A selected element time to which no rating factor is applied.

Stretch Out: 1. The practice of slowing down on the job for the purpose of spreading out available work. 2. Also see Speed Up.

Subsidized Time: See Make Up Time.

Subtracted Time: The elapsed time of an element obtained from a continuous reading time study by subtracting the watch reading at the beginning of an element from the watch reading at the end of an element.

Synthesis: In time study, means the act of constructing a time standard from standard data.

Synthetic Time Standard: A term applied to a time standard computed from standard time data as contrasted with one worked up from direct observation.

Take-Home Wages: To employees, this generally means the money in the pay envelope. The term is loosely used and should be defined in each case because personal payroll deductions vary from person to person.

Task: In wage incentives means the amount of work per hour an incentive employee must produce to earn a wage equivalent to his guaranteed hourly rate for a specific labor grade.

Temporary Standard: 1. A time standard used when the conditions of a job do not conform to those of a regular standard. 2. A standard that is subject to revision. Under local practice may be one that is temporary until finally checked and approved as permanent.

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Glossary

Continued

Temporary Time Value: See Temporary Standard.

Therblig: Any one of a number of basic elements devised by the Gilbreths to afford analysis of working methods. The elements include physical movements and mental processes associated with the movements.

"Tight Job": A job on which it is claimed the incentive standard provides less than the desired or expected earnings possibilities.

"Tight Rate": An incentive standard which it is claimed provides less than the desired or expected earnings possibilities.

Time Allowance: See Allowed Time.

Time Standard: See Allowed Time.

Time Study: A searching analysis of the method, layout, and equipment used in doing work and the determination of the normal time required by an employee using such method, layout, and equipment as may be determined to be most advantageous as a result of the analysis.

Time Study Engineer: A competent and thoroughly trained specialist whose job it is to make time studies and set standards. In some States the public use of the word "Engineer" is restricted.

Time Study Formula: A synthesis of standard data set up in algebraic form.

Time Study Sheet: A form designed to facilitate the recording of time study observations and related information such as tools, layout, materials, feeds, speeds, etc. Product sketches are often included.

Continued Next Week

Big Capacity, High Costs Cause Fear of Price Cuts

Too much capacity isn't the real fear of steel officials . . . High fixed costs and fear of price cuts are of more real concern . . . But consumers still want more steel.

Difference in viewpoints of steel producers and consumers stands out like a sore thumb this week. Producers are beginning to worry about too much steel capacity, while consumers are still clamoring for more metal.

Such divergent views aren't surprising to those who follow the steel market. Steel officials have in the past frequently been regarded as being on the pessimistic side, while robust consumers in the auto industry have been described as overly optimistic.

Who's Right Now? . . . Since World War II the auto makers have been consistently right in their appraisals of the market. But during the 1930's the steel industry was on the carpet for expanding too much. What will history repeat?

Steel people's fear of too much capacity is based on economic facts of their industry. Theirs is a classic example of high fixed costs, which means high overhead regardless of business volume. Because of this, during periods of failing demand it has sometimes seemed wiser to sell at a loss than to drastically curb production.

Too Much Capacity? . . . In the 7 years since World War II the steel industry has spent over $5 billion to raise its capacity by more than 26 million tons. And it is still expanding. Although steel officials are proud of that record, some of them are now expressing fear that capacity will soon be too large to be supported by demand.

Actually they don't fear too much capacity so much as they do high fixed costs and temptation to slash prices when orders lag. Some steel officials remain outspoken in their belief that profit margins are still too small, despite recent increases in extra charges.

They point out that a substantial drop in the ingot rate could quickly raise unit costs above selling prices. Slashing prices to keep high cost facilities operating would result in cutthroat competition at its worst.

Detroit Stays Bullish . . . Meanwhile, automakers are in the vanguard of consumers pressing bids for more steel. Most of them are still juggling supplies to meet production and will have at least a full month's undelivered orders carrying over into the third quarter. They insist that current high production will continue.

In response to a Walter Reuther charge that the industry was cramming 60 pct of its production into the first half of the year, Harlow H. Curtice (GM president) said, "We expect employment in our various plants will continue at approximately current levels throughout the balance of this year."

Want Cheaper Steel . . . There is some apprehension among smaller steel users that efforts of large consumers to get out from under high costs of steel from conversion, broker, foreign, and domestic premium-priced sources will make the drive for regular mill steel even more competitive.

Several auto and body plants believe they will have to rely on premium priced steel for as high as 25 pct of their third quarter tonnage. But they are looking for ways and means of getting out from under this extra cost.

They will not hesitate to forfeit $25 a ton cancellation penalty on conversion steel if they can replace it at regular mill price. (Conversion steel may cost two or three times more than mill steel.)

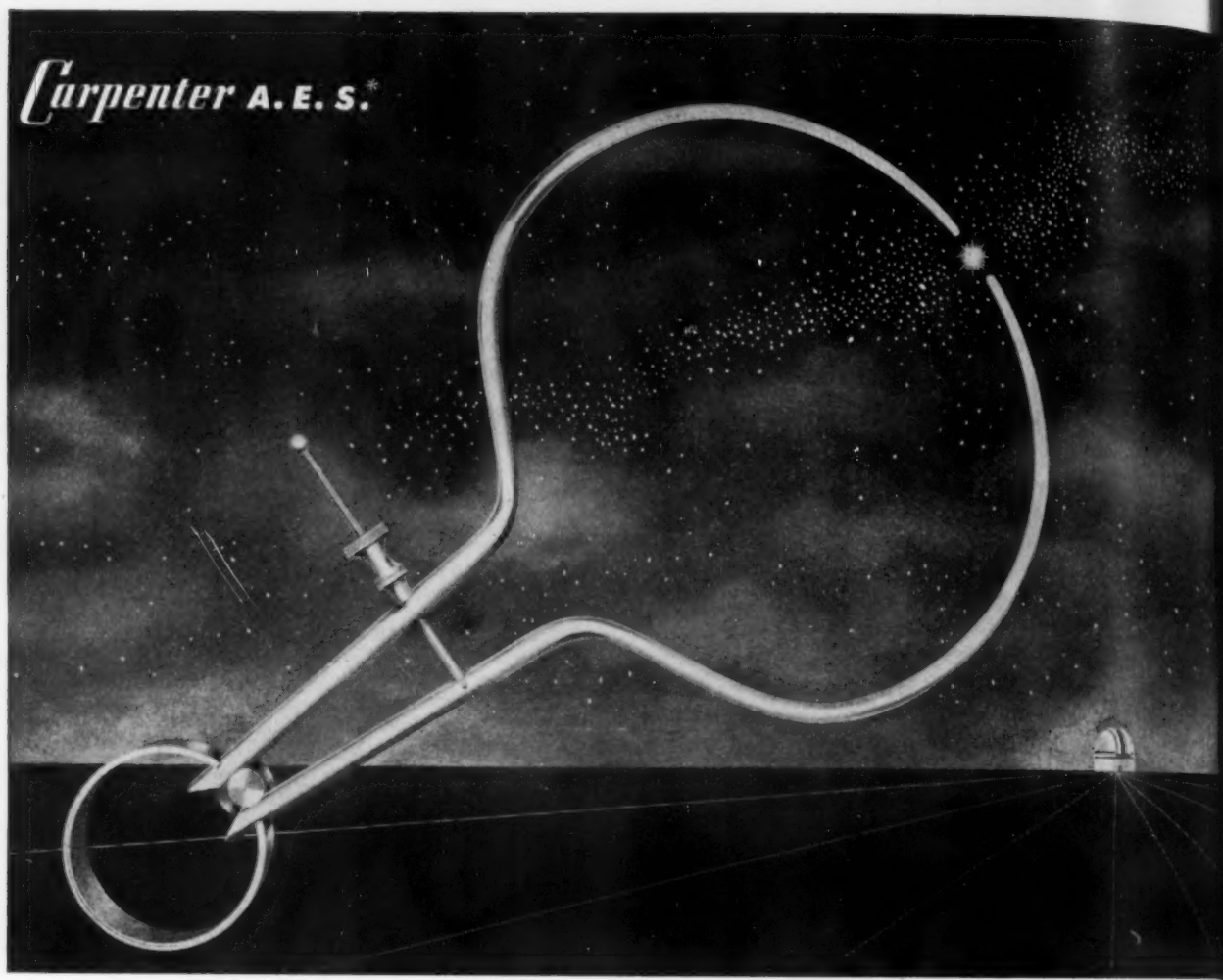
Warehouse Sales Brisk . . . Warehouse inventories have now reached their highest point since Sept. 1, 1949, although they are still suffering from imbalance. Sales are still very brisk, and despite record shipments from mills inventory accumulation is slow.

Galvanized products, hot-rolled strip, cold-finished bars in small sizes, and most wire products are in comfortable supply. Shipments of large sizes of bars, hot- and cold-rolled sheets, heavy plates and structurals, and oil country goods are awaited by buyers.

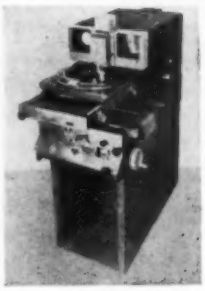
Price Rise Probable . . . Reports that a lot of raw material is piling up in some defense producers' inventories have been confirmed. This seems to apply particularly to the aircraft engine program and is not altogether due to the long time normally required between inventory accumulation and final assembly of engines.

Much depends on the outcome of steel wage negotiations to be resumed this week after a recess permitting management to prepare an answer to the steelworkers' bid for an increase. Official statements notwithstanding, best guess is that there will be a wage increase in the neighborhood of 10¢ an hr and a base price increase of about $4 a ton. Odds favor settlement without a strike, but peaceful agreement is not considered a sure thing.

THE IRON AGE Steel Scrap Composite Price rose 16¢ a ton to $38.83 per gross ton.



Finding a Faster Way to Measure a Star



*Another example of how Carpenter *Application Engineering Service is working for industry*

The giant 200-inch telescope at California's Mt. Palomar Observatory was picking up thousands of stars missed by other telescopes. But the job of measuring and coordinating the data revealed by the photographs was so big that astronomers couldn't keep abreast of it. Then the delicate astrophotometer was developed and the problem was solved. The new device *mechanically* computes the size of a star in a fraction of the time trained astronomers could do it with former devices.

Naturally, such a precise instrument posed quite a few materials problems. One was the type of steel for the hardened ways on which the machine travels horizontally back and forth. Many different special steels were tried. All failed because they couldn't meet the exacting straightness that was required.

Then, Carpenter Application Engineering Service was called in . . . and Carpenter Vega, a new air-hardening steel that shows practically no distortion in heat treatment was put to work. Used successfully for thousands of critical tool and die applications, Vega has proved to be the only steel found to stay straight enough in the 20″ lengths of the ways. Are there applications in *your* plant where a steel providing this kind of performance could give your product extra competitive advantages?

Time and again, industry is finding new ways to save money and improve the salability of products with the help of Carpenter Application Engineering Service . . . a service that uses *imagination* to apply steels for best results. A.E.S. is yours to profit by when you do business with Carpenter. THE CARPENTER STEEL COMPANY, 121 W. Bern St., Reading, Pa.

Carpenter STEEL

Tool, Alloy and Stainless Steels

Pioneering in Improved Tool, Alloy and Stainless Steels Through Continuing Research

Market Briefs and Bulletins

Appliance Inventories Down . . . Commenting on the appliance industry generally, John Sharp, president, Hotpoint Co., said representative items have a healthy inventory status. Refrigerator inventories are down 30 pct from last year, and range inventory is off 35 pct. Stocks of automatic washers are up 29 pct.

Controlled Materials . . . Two new government orders permit unrestricted sale and use of virtually all surplus controlled materials on unrated orders. The new provisions mean manufacturers may exceed current authorized production schedules to the extent that they can obtain more materials by placing unrated orders. National Production Authority has designated the orders as Dir. 23, CMP Reg. (Production) and Dir. 13, CMP Reg 6 (Construction).

Sell More Cars . . . Factory sales of new motor vehicles, climbing for the fourth straight month, reached 723,566 units in April, topping the comparable total for 1952 by 36 pct, reports the Automobile Manufacturers Assn. U. S. factory sales for the first 4 months of this year amounted to 2,572,424 units, 41 pct more than in the same period last year.

Regulate Gas Prices . . . Wholesale prices of natural gas may be regulated in interstate commerce by the Federal Power Commission, a U. S. Court of Appeals has ruled. The ruling means that about 2300 producers of natural gas who sell the bulk of their products to industry are headed for federal rate regulation unless the court decision is reversed. An appeal of the ruling is expected.

Reduce Prefab Prices . . . Butler Mfg Co., Kansas City, has made price cuts of up to 11.2 pct on its prefabricated steel buildings. The company is also bringing out a new line of rigid frame buildings.

No Nickel, Moly Decontrol . . . Rumors that nickel and molybdenum controls would be scrapped were denied by control officials this week. However, orders are in process which will remove remaining controls from all metals except nickel, molybdenum, cobalt, chromium, columbium and tantalum. Scheduled for decontrol on July 1 are: Magnesium, boron, calcium, manganese, silicon, titanium (alloys), tungsten, vanadium and zirconium.

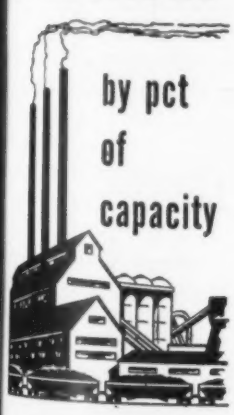
Wire Eases . . . One of the country's major wire users reports wire is easing and supply is now adequate for requirements. However there is still some tightness in tempered wire and spring steel.

Consumer Prices Hold . . . Consumer prices between March and April dipped 0.1 pct, according to a 10-city index just completed by the National Industrial Conference Board. Purchasing value of the dollar was rated at 56.3¢ as compared with the January, 1939, base of 100¢.

Sign Nickel Contract . . . U. S. government has signed an agreement with International Nickel Co. for 60,000 tons of nickel and 50,000 tons of electrolytic copper. Delivery is to start in December with completion of the agreement scheduled for 1958. Price for the nickel reflects current markets plus an allowance for amortization and additional costs of a newly developed method which makes the extra output possible. Copper price is 27¢ Canadian per lb. Both prices are subject to escalation.

Sears' Catalog Shows Price Cuts . . . Sears, Roebuck & Co.'s midsummer sale catalog lists price cuts averaging 6 pct on more than 3000 items. Among the lines on which prices were reduced are: Building materials, down 7 pct; hardware, 9 pct; electrical appliances, 8 pct.

STEEL OPERATIONS

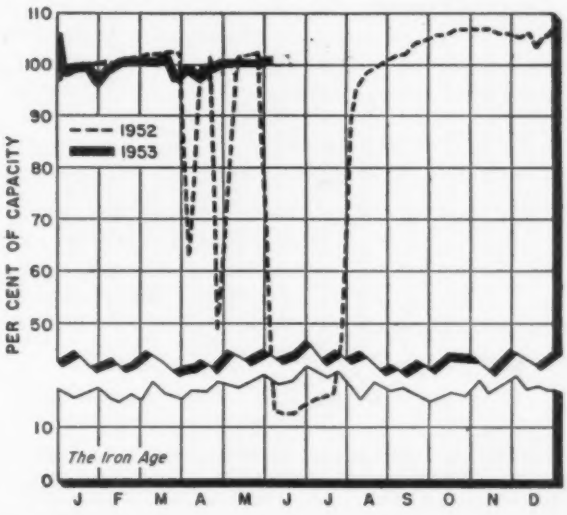


District Operating Rates

District	Week of May 31	Week of May 24
Pittsburgh	98.0	97.0*
Chicago	105.0	105.5
Philadelphia	98.0	98.0
Valley	102.0	102.0
West	106.5	107.5*
Cleveland	97.0	98.0
Buffalo	106.5	104.5
Detroit	105.0	108.0
Birmingham (South)	101.0	103.5
Wheeling	102.0	102.0*
South Ohio River	90.0	90.0
St. Louis	99.5	89.5
East	102.0	90.0*
AGGREGATE	101.0	101.0

Beginning Jan. 1, 1953, operations are based on annual capacity of 117,522,470 net tons.

* Revised



Resume Trade in Copper Futures

Commodity Exchange started copper dealing Monday . . . Alcoa, Kaiser buy Canadian metal . . . Most will come from Kitimat . . . Plant will begin in mid-1954—By *R. L. Hatschek.*

Monday was the day. Trading in copper futures was resumed on the Commodity Exchange. And members of the copper trade watched carefully as proceedings got under way. Expectations were that July copper would be offered at about 28¢ to 29¢ per lb but nobody cared to guess what the price would be for farther forward positions.

Here's what happened:

	High	Low	Close
July	28.75	28.75	28.50-29.00
Aug.	28.25	28.25	27.75-28.15
Sept.	27.20	27.15	27.20-27.75
Oct.	....	....	26.87-27.00
Nov.	26.50	26.50	26.25-26.50
Dec.	26.40	26.15	26.00-26.25
Jan.	....	....	25.75-26.15
Feb.	....	....	25.65-26.05
Mar.	....	....	25.55-25.95
Apr.	25.50	25.50	25.45-25.85
May	25.50	25.25	25.25-25.75

Expand Nicaro . . . Mobilization planners in Washington are getting set to spend some $50 million to double capacity at the government-owned Nicaro, Cuba, nickel plant, it's reported. Plan depends on the result of investigations of the newly-found ore lodes in the vicinity.

Current production rate of the plant is about 14,000 tons a year. This would be boosted to about 30,000 tons if the plan goes through.

More Kitimat Contracts . . . Following its first announcement concerning the 110,000-ton-per-year reserve for independent U. S. aluminum fabricators, Aluminum Co. of Canada has announced contracts with two U. S. primary producers. The firm has contracted to sell 600,000 metric tons of aluminum to Aluminum Co. of America and 180,000 metric tons to Kaiser.

Delivery of this metal is to be in the period of 1953 to 1958 but some 75 pct of it is to be delivered from 1955 to 1958. Reason for this, of course, is that practically all the metal will originate at Kitimat. Approximately 83,000 metric tons of capacity is scheduled to start producing there about mid-1954.

May Speed Building . . . Additional smelting capacity of 180,000 metric tons annually will be possible and the plant is designed for an ultimate capacity of 500,000 tons. Nathanial V. Davis, president of the parent Aluminium Ltd., states that fulfillment of these and other contractual obligations may involve acceleration of construction of other smelting facilities in British Columbia.

Authorization has been given for immediate preparation for two more potrooms with 90,000-ton capacity, but the decision on actual construction is being deferred for the present.

More Metal Freed . . . Mr. Davis also indicated that revision of contracts with the United Kingdom has made an additional 170,000 tons of aluminum available over the 1953 to 1957 period. Canadian fabricators were assured that these new contracts will not reduce the supply of aluminum north of the border.

Shows Confidence . . . The fact that Alcoa and Kaiser contracted to buy aluminum in such quantities —and the fact that heavy deliveries are at least a year away— indicates the sort of confidence aluminum producers have.

Of course, they'd rather expand their own facilities to produce the metal—but the government won't let them do it.

Can Adjust Inventory . . . Aluminum warehouses are permitted to dispose of excess inventories of shapes and forms by selling against unrated orders for the remainder of the second quarter.

National Production Authority Directive 1 to M-88 also permits purchasers to buy such stocks without charging the order back against any existing allotment, including automatic and self-authorization authority.

Excess inventory is defined for purposes of the directive as the quantity of each form or shape which the distributor delivered against rated orders during the two preceding months.

MONTHLY AVERAGE PRICES

The average prices of the major nonferrous metals in May based on quotations appearing in THE IRON AGE were as follows:

	Cents Per Pound
Electrolytic copper, Conn. Valley	29.845
Lake Copper, delivered	....
Straits tin, New York	97.464
Zinc, East St. Louis	11.000
Zinc, New York	11.829
Lead, St. Louis	12.540
Lead, New York	12.740

No Lake copper average is given because no quotations were available. For contracts based on this average, a statistical comparison between Lake and electrolytic copper prices will be given next week.

NONFERROUS METAL PRICES

(Cents per lb except as noted)

	May 27	May 28	May 29	May 30	June 1	June 2
Copper, electro, Conn.	29.75-30.00	29.75-30.00	29.75-30.00	....	29.75-30.00	29.75-30.00
Copper, Lake delivered	....	....	....	....	....	....
Tin, Straits, New York	97.00	96.00	95.50	....	95.00	95.00*
Zinc, East St. Louis	11.00	11.00	11.00	....	11.00	11.00
Lead, St. Louis	13.05	13.05	13.05	....	13.05	13.05

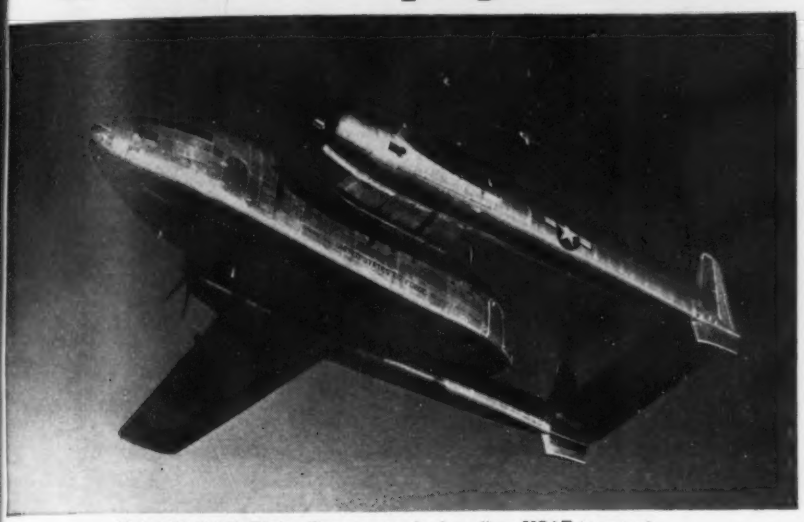
Note: Quotations are going prices.
*Tentative

BRIDGEPORT BRASS COMPANY

COPPER ALLOY BULLETIN

Bridgeport BRASS CO. MILLS IN BRIDGEPORT, CONN. AND INDIANAPOLIS, IND.—IN CANADA: NORANDA COPPER AND BRASS LIMITED, MONTREAL

Rugged Duronze Fittings Chosen for Flying Boxcars



Fairchild C-119 Flying Boxcar, standard medium USAF transport.

Bridgeport's Duronze III is playing an important role in the manufacture of Fairchild C-119 Flying Boxcars. Items such as bulldozers, trucks, 155 millimeter howitzers, jeeps, lifeboats, helicopters, ambulances and steamrollers fit easily into the cavernous holds of these twin-boomed aerial carryalls. Rugged construction is necessary, because the C-119 must deliver sustained high performance under severe conditions.

Advantages of Duronze III

Searching for a tough, hard metal for bushings, screws, nuts and other fittings, the Fairchild engineering department decided on Bridgeport's Duronze III, silicon aluminum bronze, 707. It contains approximately 91% copper, 7% aluminum, and 2% silicon. This engineering alloy was chosen in preference to other metals because of its unusually fine physical properties:

...the remarkably high tensile strength of approximately 90,000 psi and a Rockwell hardness of B85 in the annealed condition.

...excellent resistance to corrosion.

...about 9% lighter than Naval brass.

...free machining—60% rating as compared with free cutting brass.

This hard, strong alloy has fine wear resistance when used for sliding parts. It can readily be hot forged at a temperature slightly higher than that used for brass.

Duronze III Parts Used in Flying Boxcars

The illustration below shows the following parts:

(1), (3) Nuts used on engine control panel.

(2) Split bushing for nose landing gear trunnion support.

(4) Bushing used in nacelle and fuselage.

(5) Bushing for emergency escape hatch block assembly handle.

(6) Support collar used on leveling jacks on ground handling equipment.

(7) Threaded collar for leveling jacks on ground handling equipment.

(8) Bushing for engine control pedestal.

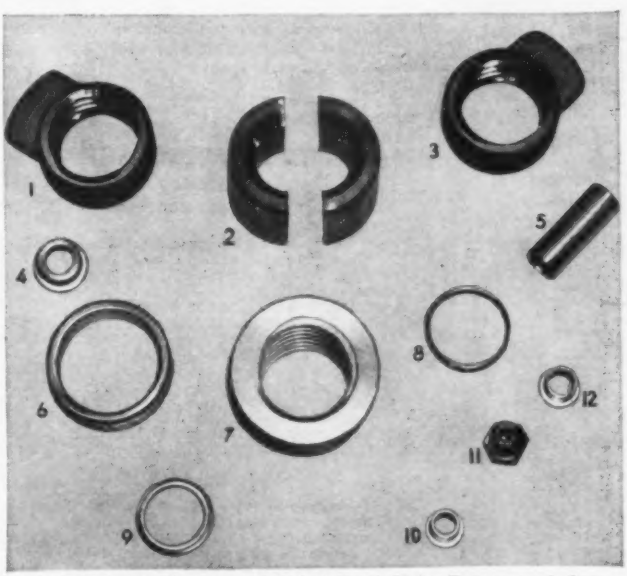
(9) Bushing for fuselage floor roller.

(10) Bushing for nacelle door actuator push rod.

(11) Bushing for master cylinder, brake system (covered with glue to prevent threads being scratched until installed).

(12) Bushing for life raft release load reducer.

Not illustrated are Duronze III trunnions of throttle stop mechanisms which are installed on engine control pedestals.



Parts used in manufacture of Fairchild C-119 Flying Boxcars made from Bridgeport's Duronze III. Courtesy Fairchild Aircraft Division, Hagerstown, Maryland.

Technical Assistance

If you are planning to upgrade the quality of your products by changing your metal specifications, contact our nearest district office for technical assistance. We will be glad to supply information on Duronze III—physical properties recommended, machining methods and suggested applications. Write for your free copy of Bridgeport's "Duronze Manual" today—on company stationery, please. (9839)

Nonferrous Prices

(Effective June 2, 1953)

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

Flat Sheet: 0.188-in., 2S, 3S, 32.9¢; 4S, 61S-O, 34.9¢; 52S, 37.2¢; 24S-O, 24S-OAL, 35.9¢; 75S-O, 75S-OAL, 43.6¢. 0.081-in., 2S, 3S, 34.1¢; 4S, 61S-O, 36.6¢; 52S, 38.9¢; 24S-O, 24S-OAL, 37.2¢; 75S-O, 75S-OAL, 45.7¢. 0.032-in., 2S, 3S, 35.9¢; 4S, 61S-O, 40.6¢; 52S, 43.5¢; 24S-O, 24S-OAL, 45.6¢; 75S-O, 75S-OAL, 57.0¢.

Plate, ¼-in. and Heavier: 2S-F, 3S-F, 30.9¢; 4S-F, 33.0¢; 52S-F, 34.7¢; 61S-O, 33.6¢; 24S-O, 24S-OAL, 35.4¢; 75S-O, 75S-OAL, 42.3¢.

Extruded Solid Shapes: Shape factors 1 to 5, 36.4¢ to 80.3¢; 12 to 14, 37.1¢ to 97.2¢; 24 to 26, 39.7¢ to $1.27; 36 to 38, 47.0¢ to $1.86.

Rod, Rolled: 1.064-in. to 4.5-in., 2S-F, 3S-F, 41.0¢ to 36.6¢; cold-finished, 0.375-in. to 3.499-in., 2S-F, 3S-F, 44.2¢ to 38.3¢.

Screw Machine Stock: Rounds, 11S-T3, ⅛ to 11/32-in., 58.4¢ to 45.9¢; ⅜ to 1½-in., 45.3¢ to 42.6¢; 1 9/16 to 3-in., 42.0¢ to 39.3¢. Base 5000 lb.

Drawn Wire: Coiled 0.051 to 0.374-in., 2S, 43.2¢ to 31.7¢; 52S, 52.4¢ to 38.3¢; 17S-T4, 59.0¢ to 41.0¢; 61S-T4, 52.9¢ to 40.5¢.

Extruded Tubing: Rounds, 63S-T5, OD 1¼ to 2 in., 40.5¢ to 59.0¢; 2 to 4 in., 36.6¢ to 49.7¢; 4 to 6 in., 37.1¢ to 45.3¢; 6 to 9 in., 37.6¢ to 47.5¢.

Roofing Sheet: Flat, per sheet, 0.019-in., 28 x 72 in., $1.247; x 96 in., $1.662; x 120 in., $2.077; x 144 in., $2.494. Coiled sheet, per lb, 0.019 in. x 28 in., 30.8¢; 0.024 in. x 28 in., 29.3¢.

Magnesium

(F.o.b. mill, freight allowed)

Sheet and Plate: FS1-O, ¼ in., 66¢; 3/16 in., 68¢; ⅛ in., 70¢; B & S Gage 10, 71¢; 12, 75¢. Specification grade higher. Base: 30,000 lb.

Extruded Round Rod: M, diam ¼ to 0.311 in., 77¢; ½ to ¾ in., 60.5¢; 1¼ to 1.749 in., 56¢; 2½ to 5 in., 51.5¢. Other alloys higher. Base up to ¾ in. diam, 10,000 lb; ¾ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes, Rectangles: M. In weight per ft, for perimeters less than size indicated; 0.10 to 0.11 lb, 3.5 in., 65.3¢; 0.22 to 0.25 lb, 5.9 in., 62.3¢; 0.50 to 0.59 lb, 8.6 in., 59.7¢; 1.8 to 2.59 lb, 19.5 in., 56.8¢; 4 to 6 lb, 28 in., 52¢. Other alloys higher. Base, in weight per ft of shape: Up to ½ lb, 10,000 lb; ½ to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: M, 0.049 to 0.057 in. wall thickness: OD, ¼ to 5/16 in., $1.43; 5/16 to ⅜ in., $1.29; ½ to ⅝ in., 96¢; 1 to 2 in., 79¢; 0.165 to 0.219 in. wall; OD, ⅝ to ¾ in., 64¢; 1 to 2 in., 60¢; 3 to 4 in., 59¢. Other alloys higher. Base, OD: Up to 1½ in., 10,000 lb; 1½ to 3 in., 20,000 lb; over 3 in., 30,000 lb.

Titanium

(100,000 lb base, f.o.b. mill)

Commercially pure and alloy grades; Sheets and strip, HR or CR, $15; Plate, HR, $12; Wire, rolled and/or drawn, $10; Bar, HR or forged, $6; Forgings, $6.

Nickel Monel, Inconel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	86½	67½	92½
Strip, CR	92½	70½	98½
Rod, bar	82½	65½	88½
Angles, HR	82½	65½	88½
Plate, HR	84½	66½	90½
Seamless Tube	115½	100½	137½
Shot, blocks		57	

Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Extruded Shapes
Copper	48.51		50.58
Copper, h-r	50.48	46.83	
Copper, drawn		48.08	
Low brass	45.99	45.68	
Yellow brass	42.87	42.56	
Red brass	47.11	46.80	
Naval brass	47.01	41.07	42.33
Leaded brass			39.95
Com. bronze	48.76	48.45	
Mang. bronze	50.73	44.62	46.18
Phos. bronze	70.50	70.75	
Muntz metal	44.91	40.47	41.72
Ni silver, 10 pct	56.56	59.83	62.89

PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	20.50
Aluminum pig	19.50
Antimony, American, Laredo, Tex.	34.50
Beryllium copper, per lb conta'd Be.	$40.00
Beryllium aluminum 5% Be, Dollars per lb contained Be	$72.75
Bismouth, ton lots	$2.25
Cadmium, del'd	$2.00
Cobalt, 97-99% (per lb)	$2.40 to $2.47
Copper, electro, Conn. Valley	29.50 to 30.00
Copper, Lake, delivered	
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$175 to $185
Lead, St. Louis	13.05
Lead, New York	13.25
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb.	27.00
Magnesium, sticks, 100 to 500 lb.	45.00 to 47.00
Mercury, dollars per 76-lb. flask, f.o.b. New York	$195 to $197
Nickel electro, f.o.b. N. Y. warehouse	63.08
Nickel oxide sinter, at Copper Creek, Ont., contained nickel	56.25
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$90 to $93
Silver, New York, cents per oz.	85.25
Tin New York	95.00
Titanium, sponge	$5.00
Zinc, East St. Louis	11.00
Zinc, New York	11.83
Zirconium copper, 50 pct	$6.20

REMELTED METALS

Brass Ingot

(Cents per lb, delivered carloads)

85-5-5-5 ingot	
No. 115	26.00
No. 120	25.00
No. 123	24.00
80-10-10 ingot	
No. 305	30.00
No. 315	28.00
88-10-2 ingot	
No. 210	38.25
No. 215	34.75
No. 245	30.25
Yellow ingot	
No. 405	21.25
Manganese bronze	
No. 421	26.50

Aluminum Ingot

(Cents per lb del'd, 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper, max.	24.75-25.00
0.60 copper, max.	24.50-24.75
Piston alloys (No. 122 type)	22.75-23.20
No. 12 alum. (No. 2 grade)	22.00-22.75
108 alloy	22.50-23.00
195 alloy	22.80-24.00
13 alloy (0.60 copper max.)	24.50-24.75
ASX-679	22.50-23.00

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95-97½%	23.25-24.00
Grade 2—92-95%	22.50-23 00
Grade 3—90-92%	21.50-22.50
Grade 4—85-90%	20.50-22.00

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, freight allowed, 5000 lb lots)

Copper	
Cast, oval, 15 in. or longer	45.14
Electrodeposited	37.98
Flat rolled	45.64
Brass, 80-20	
Cast, oval, 15 in. or longer	43.515
Zinc, flat cast	20.25
Ball, anodes	18.50
Nickel, 99 pct plus	
Cast	79.50
Roller, depolarized	80.50
Cadmium	$2.15
Silver 999 fine, rolled, 100 oz lots, per troy oz, f.o.b. Bridgeport, Conn.	94½

Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum	63
Copper sulfate, 99.5 crystals, bbl.	12.85
Nickel salts, single or double, 4-100 lb bags, frt. allowed	30.00
Nickel chloride, 375 lb drum	38.00
Silver cyanide, 100 oz lots, per oz.	75½
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc cyanide, 100 lb drum	47.7

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over.)

	Heavy	Turnings
Copper	28⅝	27⅝
Yellow brass	21⅝	19⅝
Red brass	25⅛	24⅛
Comm. bronze	26⅛	25⅛
Mang. bronze	20	19¼
Brass rod ends	19¾	

Custom Smelters' Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	24½—25
No. 2 copper wire	23 —23½
Light copper	21½—22
*Refinery brass	20

* Dry copper content.

Ingot Makers' Scrap

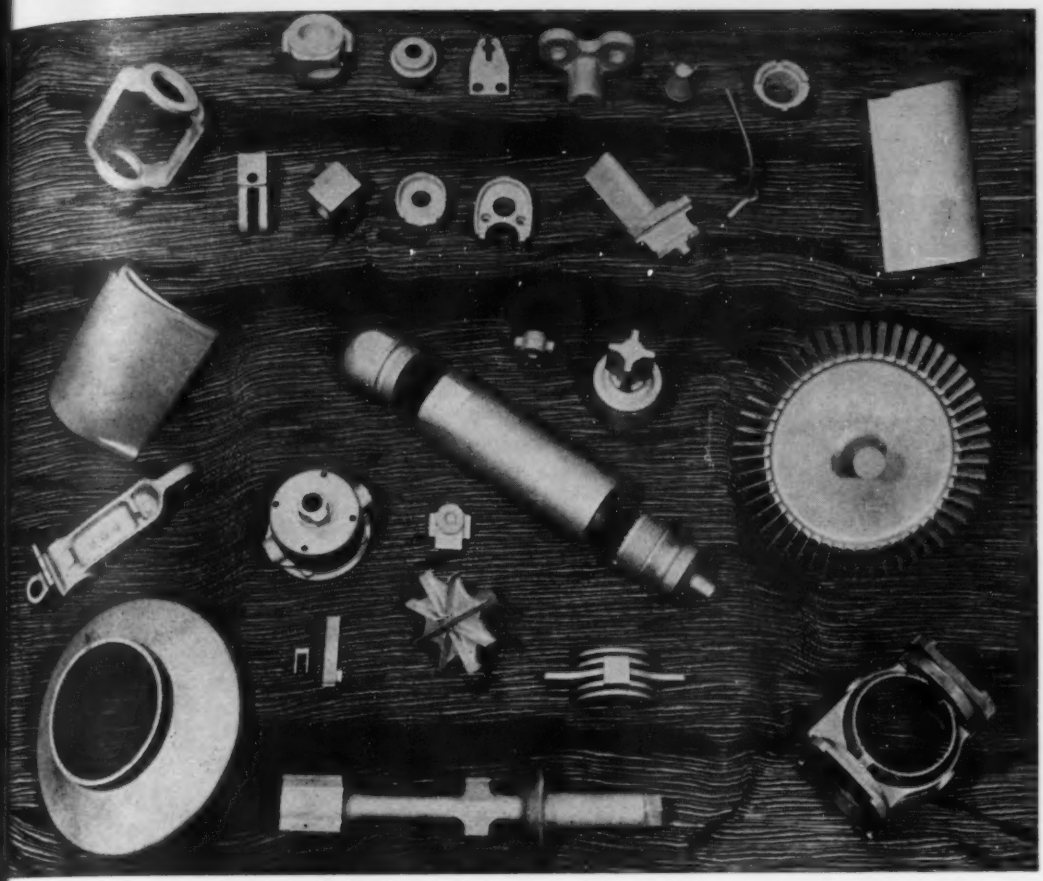
(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	24½—25
No. 2 copper wire	23 —23½
Light copper	21½—22
No. 1 composition	18 —18½
No. 1 comp. turnings	17½—18
Rolled brass	14
Brass pipe	15
Radiators	13½—14
Aluminum	
Mixed old cast	12¾—13½
Mixed new clips	13 —15
Mixed turnings, dry	13 —14
Pots and pans	13 —13½

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass	
No. 1 heavy copper and wire	23 —23½
No. 2 heavy copper and wire	20½—21
Light copper	18½—19
New type shell cuttings	18½—19
Auto radiators (unsweated)	13
No. 1 composition	16½—17
No. 1 composition turnings	16 —16½
Unlined red car boxes	15 —16
Cocks and faucets	15
Mixed heavy yellow brass	11½
Old rolled brass	14
Brass pipe	16
New soft brass clippings	16½—17½
Brass rod ends	16 —16½
No. 1 brass rod turnings	15 —16
Aluminum	
Alum. pistons and struts	6 — 6½
Aluminum crankcases	9
2S aluminum clippings	13
Old sheet and utensils	9
Borings and turnings	6½
Misc. cast aluminum	9
Dural clips (24S)	10
Zinc	
New zinc clippings	5½
Old zinc	4½
Zinc routings	3½
Old die cast scrap	3½
Nickel and Monel	
Pure nickel clippings	100
Clean nickel turnings	60 —70
Nickel anodes	100
Nickel rod ends	100
New Monel clippings	33 —35
Clean Monel turnings	25
Old sheet Monel	30 —32
Nickel silver clippings, mixed	14
Nickel silver turnings, mixed	13
Lead	
Soft scrap, lead	10 —10½
Battery plates (dry)	5½— 5¾
Batteries, acid free	4 —4 1/16
Magnesium	
Segregated solids	15 —15
Castings	14 —15
Miscellaneous	
Block tin	80
No. 1 pewter	55
No. 1 auto babbitt	45
Mixed common babbitt	12 —13½
Solder joints	15 —16
Siphon tops	46
Small foundry type	15½
Monotype	13½
Lino. and stereotype	13¾
Electrotype	10½
Hand picked type shells	8
Lino. and stereo. dross	4½
Electro dross	4



Inco-Cast precision investment castings offer a practical way to make a wide variety of difficult-to-machine shapes including: thin vanes, wing sections, non-critical gear teeth, slots and threads.

How you can save up to 50%... on small parts

With Inco-Cast precision investment castings, others are saving as much as 50 percent of the production cost on small parts.

Perhaps you can, too. If you need small parts with complex internal sections, shallow blind holes, unmachinable cavities or other shapes that are costly to make, it may pay you to investigate precision casting. For precision casting lends itself to economical production of intricate shapes where tolerances as close as plus or minus .005" per linear inch are needed.

Inco-Cast precision castings not only save you money—they make it possible for you to use extra strong and harder alloys for longer service life...

- You can reduce your machine shop bottleneck because they require little or no machining.
- They make possible the use of hard-to-machine metals.
- In many applications you can get parts made by precision casting that would be impossible to make by other methods.
- Frequently it's even possible to simplify your designs when you use precision castings.

If you have a problem with a part whose cost of production seems out of line — if it's a shape where a single casting might eliminate many machining operations — if you have a design that cannot be worked out economically — just send a blueprint or actual sample with an estimate of the quantity needed.

Inco casting specialists will analyze your problem and, if precision casting is a practical solution, they will give you an estimate of costs and their suggestion on the best alloy to use.

In the meantime, for more detailed information about this money-saving process, write for your free copy of "Investment Casting—Its Advantages and Practical Applications."

The International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y.

SOME ALLOYS PRECISION CAST BY INCO

Nickel-Base Alloys
Ferrous Alloys
Austenitic Stainless Steels
Martensitic Stainless Steels
Ferritic Stainless Steels
Carbon Steels
Alloy Steels
Tool Steels
Cobalt-Base Alloys

Inco Castings PRECISION, SAND, CENTRIFUGAL

INCO TRADE MARK

Lean Yard Stocks Toughen Trading

Birmingham brokers report difficulty filling orders . . . St. Louis inches up prices on No. 2 . . . Reason: low yard intake . . . Market expected to drowse through part of summer.

For the scrap iron and steel market, summer's dog days arrived unseasonably some weeks ago and now trading is expected to drowse through a good part of summer. Steel mill stockpiles are slimming—but slowly as transfusions of industrial scrap shipments continue.

In a few cases the scrap market is showing tougher tendencies. Increased trading is not the stimulant. Depleted dealer stocks are. Remark of one scrap dealer was that "at those prices you can't get blood out of the turnip."

Birmingham scrap brokers reported difficulty in filling even sparse orders at low prices currently in effect. Low prices are being resisted by Southern dealers, who are holding the little scrap they are accepting. Dealer purchasing trend is to keep stocks small. There does not seem to be any willingness to speculate in a depressed market—yet.

No. 2 grades of steel in St. Louis even inched up a dollar as a result of skimpy collections. Flurries of doubtful optimism hit two other scrap centers—but generally optimism is being postponed for a month or so.

Pittsburgh—Inertia settled over the market this week. Filling of old orders constituted virtually the only activity. Indications are that new business is at least several weeks off. A large consumer is taking in old-order material on a scheduled basis with the cleanup slated for end of month. When this is disposed of, the market may sag even further barring substantial new business to bolster it.

Chicago—Market here began to take on a brisker tone due to several factors. Scrap flow had been tightening, there was some end-of-the-month rush buying. With the exception of electric furnace grades, activity was more spirited. Interest in railroad grades was on the increase. Blast furnace was more impressive with some $20 broker buying offers reportedly turned down. Actual mill purchases have not been impressive, and optimism seems more due to a tightening of supply than increased mill business.

Philadelphia—Last week was extremely quiet in the scrap trade. Prices in general were steady at the previously quoted levels with only a few exceptions. No. 2 bundles are practically unsalable except to one consumer which has accepted limited quantities. Little change is foreseen for the next week at least.

New York—The scrap market is in for a lazy summer as new buying remains becalmed. Dealer yards have lowered their intake to a minimum, aren't speculating. No. 2 bundles are reportedly being stockpiled (optimism?) but not in major quantities. In the absence of substantial trading the price line held almost unchanged.

Detroit—Automotive lists going at high prices gave a feeling of strength to the market this week. It was not translated into any price increases in dealer scrap, but appeared to halt the downward trend. Little dealer scrap is moving and mills are slow to state a price for anything. There is little hope for the market firming at the present level and lower prices are forecast before the hot weather ends.

Cleveland—Dealers here definitely believe the market has "bottomed out." No price changes are expected this month but observers believe yard scrap will go for higher prices in July. Bullish predictions were recently bolstered in the Valley area when industrial scrap reportedly went for $41.

Birmingham—Scrap brokers in this area report difficulty in filling the limited amount of orders coming in at prices offered by the mills. Southern dealers are resisting these prices and seem content to hold what little scrap is being brought in. One broker just returned from a trip through the territory says he found inventories very low. Dealers reported very little coming in at the prices they can pay for it under present mill offerings. Prices were unchanged this week with few orders received.

St. Louis—Market for No. 2 heavy melting and No. 2 bundles is up $1 a ton as a result of the letdown in collections. The trade holds this is due to the low prices which have been prevailing, making it unprofitable for truckers to gather material from rural areas. Balers report insufficient supplies to keep operations going.

Cincinnati—Flow of scrap is picking up as consumers show a tendency to forsake strictly permanent buying. One large consumer has shown a willingness to extend commitments beyond the June strike deadline. Turnings market quieted down this week as one consumer closed openhearth doors to short shovelings. Price on that item fell $3 to $21.

Boston—New England scrap market showed a few isolated signs of firmness on the strength of local demand. No. 2 bundles edged up $1 and heavy breakable cast moved $2 higher. At the same time, chemical borings dropped $3 and there was little, if any, business done in No. 1 cast.

Buffalo—Further weakness was in evidence here as a leading consumer delayed placement of new orders. Speculation was immediately heard over possibility of additional price declines. Prices are unchanged. Only bullish market factor was lifting of an embargo on shipments by another consumer. Rush of water scrap continued with approximately 9000 tons arriving.

West Coast—Movement continued steady last week for mills actively in the market. New prices were established for June. The Los Angeles cast market dipped slightly with foundries reporting business poor. In Northern California, however, cast was slightly stronger.

Scrap Prices

(Effective June 2, 1953)

Pittsburgh

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 bundles	38.00 to 39.00
No. 2 bundles	31.00 to 32.00
Machine shop turn	24.00 to 25.00
Mixed bor. and ms. turns.	24.00 to 25.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	29.00 to 30.00
Low phos. punch'gs, plate	45.00 to 46.00
Heavy turnings	38.00 to 39.00
No. 1 RR. hvy. melting	43.00 to 44.00
Scrap rails, random lgth.	45.00 to 46.00
Rails 2 ft and under	51.00 to 52.00
RR. steel wheels	50.00 to 51.00
RR. spring steel	50.00 to 51.00
RR. couplers and knuckles	50.00 to 51.00
No. 1 machinery cast	49.00 to 50.00
Cupola cast	40.00 to 41.00
Heavy breakable cast	37.00 to 38.00
Malleable	44.00 to 45.00

Chicago

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 factory bundles	40.00 to 41.00
No. 1 dealers' bundles	37.00 to 39.00
No. 2 dealers' bundles	32.00 to 33.00
Machine shop turn.	20.00 to 21.00
Mixed bor. and turn.	20.00 to 21.00
Shoveling turnings	21.00 to 23.00
Cast iron borings	20.00 to 21.00
Low phos. forge crops	44.00 to 45.00
Low phos. punch'gs, plate	41.00 to 42.00
Low phos. 3 ft and under	41.00 to 43.00
No. 1 RR. hvy. melting	41.00 to 42.00
Scrap rails, random lgth.	44.00 to 45.00
Rerolling rails	47.00 to 49.00
Rails 2 ft and under	50.00 to 51.00
Locomotive tires, cut	45.00 to 46.00
Cut bolsters & side frames	45.00 to 46.00
Angles and splice bars	46.00 to 48.00
RR. steel car axles	51.00 to 53.00
RR. couplers and knuckles	46.00 to 47.00
No. 1 machinery cast	42.00 to 43.00
Cupola cast	38.00 to 40.00
Heavy breakable cast	32.00 to 33.00
Cast iron brake shoes	35.50 to 36.50
Cast iron car wheels	39.00 to 41.00
Malleable	39.00 to 40.00
Stove plate	32.00 to 33.00

Philadelphia Area

No. 1 hvy. melting	$40.00 to $41.00
No. 2 hvy. melting	36.00 to 37.00
No. 1 bundles	40.00 to 41.00
No. 2 bundles	29.00 to 31.00
Machine shop turn.	26.00 to 27.00
Mixed bor., short turn.	30.00 to 31.00
Shoveling turnings	31.00 to 32.00
Clean cast chem. borings	38.50 to 39.00
Low phos. 5 ft and under	43.50 to 44.50
Low phos. 2 ft and under	45.00 to 46.00
Low phos. punchings	45.50 to 46.50
Elec. furnace bundles	43.50 to 44.50
Heavy turnings	39.50 to 40.50
RR. steel wheels	49.00 to 50.00
RR. spring steel	49.00 to 50.00
Rails 18 in. and under	55.00 to 56.00
Cupola cast	38.00 to 39.00
Heavy breakable cast	41.00 to 42.00
Cast iron carwheels	46.00 to 47.00
Malleable	46.00 to 47.00
Unstripped motor blocks	28.00 to 29.00
No. 1 machinery cast	47.00 to 48.00
Charging box cast	39.00 to 41.00

Cleveland

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 bundles	38.00 to 39.00
No. 2 bundles	33.00 to 34.00
No. 1 busheling	38.00 to 39.00
Machine shop turn.	21.00 to 22.00
Mixed bor. and turn.	26.00 to 27.00
Shoveling turnings	26.00 to 27.00
Cast iron borings	26.00 to 27.00
Low phos. 2 ft and under	42.00 to 43.00
Drop forge flashings	38.00 to 39.00
No. 1 RR. hvy. melting	45.00 to 46.00
Rails 3 ft and under	52.00 to 53.00
Rails 18 in. and under	55.00 to 56.00
Railroad grate bars	40.00 to 41.00
Steel axle turnings	38.00 to 39.00
Railroad cast	47.00 to 48.00
No. 1 machinery cast	47.00 to 48.00
Stove plate	43.00 to 44.00
Malleable	48.00 to 49.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 bundles	38.00 to 39.00
No. 2 bundles	31.00 to 32.00
Machine shop turn.	23.00 to 24.00
Shoveling turnings	26.00 to 27.00
Cast iron borings	26.00 to 27.00
Low phos. plate	46.00 to 47.00

Buffalo

No. 1 hvy. melting	$40.50 to $41.50
No. 2 hvy. melting	38.00 to 38.50
No. 1 busheling	40.50 to 41.50
No. 1 bundles	40.50 to 41.50
No. 2 bundles	36.00 to 36.50
Machine shop turn.	23.00 to 24.00
Mixed bor. and turn.	27.00 to 28.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	27.00 to 28.00
Low phos. plate	44.00 to 45.00
Scrap rails, random lgth.	45.75 to 46.75
Rails 2 ft and under	51.75 to 52.75
RR. steel wheels	50.75 to 51.75
RR. spring steel	50.75 to 51.75
RR. couplers and knuckles	50.75 to 51.75
No. 1 machinery cast	42.00 to 43.00
No. 1 cupola cast	38.00 to 39.00

Detroit

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 bundles, openhearth	36.00 to 37.00
No. 2 bundles	23.00 to 24.00
Heavy turnings	27.00 to 28.00
New busheling	34.00 to 35.00
Drop forge flashings	34.00 to 35.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Electric furnace, bundles	36.00 to 37.00
Low phos. punch'gs, plate	36.00 to 37.00
No. 1 cupola cast	44.00
Heavy breakable cast	36.00
Stove plate	37.00
Automotive cast	44.00

St. Louis

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	32.00 to 33.00
No. 2 bundled sheets	29.00 to 30.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	17.00 to 19.00
Cast iron borings	11.00 to 13.00
Rails, random lengths	41.00 to 42.00
Rails 18 in. and under	49.00 to 51.00
Locomotive tires, uncut	43.00 to 44.00
Angles and splice bars	43.00 to 44.00
Std. steel car axles	46.00 to 48.00
RR. spring steel	43.00 to 44.00
Cupola cast	39.00 to 41.00
Hvy. breakable cast	30.00 to 32.00
Cast iron brake shoes	38.00 to 39.00
Stove plate	37.00 to 38.00
Cast iron car wheels	43.00 to 44.00
Malleable	35.00 to 36.00
Unstripped motor blocks	33.00 to 34.00

New York

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	29.00 to 29.50
No. 2 bundles	25.00 to 26.00
Low phos. 2 ft and less	37.00 to 38.00
Machine shop turn.	18.00 to 19.00
Mixed bor. and turn.	18.00 to 19.00
Shoveling turnings	21.50 to 22.50
Clean cast chem. borings	29.00 to 30.00
No. 1 machinery cast	42.00 to 43.00
Mixed yard cast	33.00 to 34.00
Charging box cast	34.00 to 35.00
Heavy breakable cast	34.00 to 35.00
Unstripped motor blocks	22.00 to 23.00

Birmingham

No. 1 hvy. melting	$29.50 to $30.50
No. 2 hvy. melting	27.00 to 28.00
No. 1 bundles	29.50 to 30.50
No. 2 bundles	25.00 to 26.00
No. 1 busheling	29.50 to 30.50
Machine shop turn.	20.75 to 21.75
Shoveling turnings	22.75 to 23.75
Cast iron borings	22.75 to 23.75
Electric furnace bundles	32.00 to 33.00
Bar crops and plate	39.00 to 40.00
Structural and plate, 2 ft	36.00 to 37.00
No. 1 RR. hvy. melting	35.00 to 36.00
Scrap rails, random lgth.	41.00 to 42.00
Rerolling rails	45.00 to 46.00
Rails, 18 in. and under	45.00 to 46.00
Angles & splice bars	45.00 to 46.00
Std. steel axles	45.00 to 46.00
No.1 cupola cast	38.00 to 39.00
Stove plate	34.00 to 35.00
Cast iron car wheels	46.00 to 47.00
Charging box cast	30.00 to 31.00
Heavy breakable	30.00 to 31.00
Unstripped motor blocks	32.00 to 33.00
Mashed tin cans	17.00 to 18.00

Boston

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting		$30.75
No. 2 hvy. melting	$25.00 to	26.00
No. 1 bundles		30.25
No. 2 bundles	23.00 to	24.00
No. 1 busheling	29.00 to	31.00
Elec. furnace, 3 ft & under		33.25
Machine shop turn.	16.00 to	17.00
Mixed bor. and short turn.		20.00
Shoveling turnings	20.00 to	21.00
Clean cast chem. borings		28.17
No. 1 machinery cast	30.00 to	31.00
Mixed cupola cast	26.00 to	28.00
Heavy breakable cast	27.00 to	29.00
Stove plate	26.00 to	27.00
Unstripped motor blocks		22.00

Cincinnati

Brokers' buying prices per gross ton, on cars:

No. 1 hvy melting	$38.00 to $39.00
No. 2 hvy. melting	35.00 to 36.00
No. 1 bundles	38.00 to 39.00
No. 2 bundles	31.00 to 32.00
Machine shop turn.	18.00 to 19.00
Mixed bor. and turn.	20.00 to 21.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	20.00 to 21.00
Low phos. 18 in. & under	46.00 to 47.00
Rails, random lengths	42.00 to 43.00
Rails, 18 in. and under	50.00 to 51.00
No. 1 cupola cast	41.00 to 42.00
Hvy. breakable cast	37.00 to 38.00
Drop broken cast	48.00 to 49.00

San Francisco

No. 1 hvy. melting		$28.00
No. 2 hvy. melting		24.00
No. 1 bundles		25.00
No. 2 bundles		22.00
No. 3 bundles		18.00
Machine shop turn.		10.00
Cast iron borings		15.00
No. 1 RR. hvy. melting		28.00
No. 1 cupola cast		39.00

Los Angeles

No. 1 hvy. melting		$24.00
No. 2 hvy. melting		20.00
No. 1 bundles		23.00
No. 2 bundles		20.00
No. 3 bundles		16.00
Mach. shop turn.		8.00
Shoveling turnings		12.00
Cast iron borings		12.00
Elec. fur. 1 ft and under.		29.00
No. 1 RR. hvy. melting		24.00
No. 1 cupola cast	$35.00 to	36.00

Seattle

No. 1 hvy. melting		$31.00
No. 2 hvy. melting		27.00
No. 1 bundles		28.00
No. 2 bundles		23.00
No. 1 cupola cast		37.00
Mixed yard cast		35.00

Hamilton, Ont.

No. 1 hvy. melting		$35.50
No. 1 bundles		35.50
No. 2 bundles		35.00
Mechanical bundles		33.50
Mixed steel scrap		31.50
Bushelings		30.50
Bush., new fact. prep'd.		32.50
Bush., new fact. unprep'd.		32.50
Short steel turnings		29.50
Mixed bor. and turn.		29.50
Rails, remelting		35.50
Rails, rerolling		44.50
Cast scrap		50.00

Comparison of Prices

(Effective June 2, 1953)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	June 2 1953	May 26 1953	May 5 1953	June 3 1952
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	3.775¢	3.775¢	3.775¢	3.60¢
Cold-rolled sheets	4.575	4.575	4.575	4.35
Galvanized sheets (10 ga)	5.075	5.075	5.075	4.80
Hot-rolled strip	3.725	3.725	3.725	3.50
Cold-rolled strip	5.20	5.20	5.20	4.75
Plate	3.90	3.90	3.90	3.70
Plates wrought iron	9.00	9.00	9.00	7.85
Stainl's C-R strip (No. 302)	39.75	39.75	39.75	36.75
Tin and Ternplate: (per base box)				
Tinplate (1.50 lb.) cokes	$8.95	$8.95	$8.95	$8.70
Tinplate, electro (0.50 lb.)	7.65	7.65	7.65	7.40
Special coated mfg. ternes	7.75	7.75	7.75	7.50
Bars and Shapes: (per pound)				
Merchant bars	3.95¢	3.95¢	3.95¢	3.70¢
Cold finished bars	4.925	4.925	4.925	4.55
Alloy bars	4.675	4.675	4.675	4.30
Structural shapes	3.85	3.85	3.85	3.65
Stainless bars (No. 302)	34.00	34.00	34.00	31.50
Wrought iron bars	10.05	10.05	10.05	9.50
Wire: (per pound)				
Bright wire	5.225¢	5.225¢	5.225¢	4.85¢
Rails. (per 100 lb.)				
Heavy rails	$4.075	$4.075	$3.775	$3.60
Light rails	5.00	5.00	4.25	4.00
Semifinished Steel: (per net ton)				
Rerolling billets	$59.00	$59.00	$59.00	$56.00
Slabs, rerolling	59.00	59.00	59.00	56.00
Forging billets	70.50	70.50	70.50	66.00
Alloy blooms, billets, slabs	76.00	76.00	76.00	70.00
Wire Rod and Skelp: (per pound)				
Wire rods	4.325¢	4.325¢	4.325¢	4.10¢
Skelp	3.55	3.55	3.55	3.35
Composite: (per pound)				
Finished steel base price	4.417¢	4.417¢	4.376¢	4.131¢

	June 2 1953	May 26 1953	May 5 1953	June 3 1952
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$60.69	$60.69	$60.69	$58.19
Foundry, Valley	55.00	55.00	55.00	52.50
Foundry, Southern, Cin'ti	58.93	58.93	58.93	55.58
Foundry, Birmingham	51.38	51.38	51.38	48.88
Foundry, Chicago†	55.00	55.00	55.00	52.50
Basic del'd Philadelphia	59.77	59.77	59.77	57.27
Basic, Valley furnace	54.50	54.50	54.50	52.00
Malleable, Chicago†	55.00	55.00	55.00	52.50
Malleable, Valley	55.00	55.00	55.00	52.50
Ferromanganese‡	226.99	226.99	226.25	146.25

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.

‡ Average of U. S. Prices quoted on Ferroalloy pages.

Composite: (per gross ton)				
Pig iron	$55.26	$55.26	$55.26	$52.77
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$38.50	$38.50	$39.50	$43.00*
No. 1 steel, Phila. area	40.50	40.50	40.50	41.50*
No. 1 steel, Chicago	37.50	37.00	36.50	41.50*
No. 1 bundles, Detroit	36.50	36.50	38.50	41.15*
Low phos., Youngstown	46.50	46.50	47.50	46.50*
No. 1 mach'y cast, Pittsburgh	49.50	49.50	49.50	52.75
No. 1 mach'y cast, Philadel'a.	47.50	47.50	47.50	52.00*
No. 1 mach'y cast, Chicago	42.50	42.00	44.00	44.50

* Basing pt., less broker's fee. † Shipping pt., less broker's fee. Delivered prices, including broker's fee, unless otherwise noted.

Composite: (per gross ton)				
No. 1 heavy melting scrap	$38.83	$38.17	$38.83	$42.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75	$14.75	$14.75	$14.75
Foundry coke, prompt	17.25	17.25	17.25	17.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	29.875‡	29.875‡	29.75‡	24.50
Copper, Lake, Conn.	....	....	....	24.625
Tin, Straits, New York	*95.00*†	96.00*	98.00	$1.21½
Zinc, East St. Louis	11.00	11.00	11.00	17.50
Lead, St. Louis	13.05	13.05*	12.30	14.80
Aluminum, virgin ingot	20.50	20.50	20.50	19.00
Nickel, electrolytic	63.08	63.08	63.08	59.58
Magnesium, ingot	27.00	27.00	27.00	24.50
Antimony, Laredo, Tex.	34.50	34.50	34.50	39.00

† Tentative. ‡ Average. * Revised.

Composite Price Notes

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strips, representing major portion of finished steel shipment. Index recapitulated in Aug. 28, 1941, issue and in May 12, 1949.

Starting with the issue of May 12, 1949, the weighted finished steel composite was revised for the years 1941 to date. The weights used are based on the average product shipments for the 7 years 1937 to 1940 inclusive and 1946 to 1948 inclusive. The use of quarterly figures has been eliminated because it was too sensitive. (See p. 139 of May 12, 1949, issue.)

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Scrap Steel Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

Warehouse Price Notes

Base Quantities (Standard unless otherwise keyed): Cold finished bars; 2000 lb or over. Alloy bars; 1000 to 1999 lb. All others; 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets, for quantity.

Exceptions: (1)500 to 1499 lb, (2)6000 lb or over, (3)450 to 1499 lb, (4)2000 to 3999 lb.

WAREHOUSES — Base price, f.o.b., dollars per 100 lb.

Cities	City Delivery Charge	Sheets: Hot-Rolled	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)	Strip: Hot-Rolled	Strip: Cold-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled	Bars: Cold-Finished	Alloy Bars: Hot-Rolled A 4615 As rolled	Alloy Bars: Hot-Rolled A 4140 Annealed	Alloy Bars: Cold-Drawn A 4615 As rolled	Alloy Bars: Cold-Drawn A 4140 Annealed
Baltimore	$.20	5.81	7.17	7.38–8.04	6.42	.....	6.05	6.47	6.41	7.18–7.43	.....	.....	.....	.....
Birmingham	.15	5.80	6.65	7.70[1]	5.80	.....	6.10	5.95	5.80	7.85	.....	.....	.....	.....
Boston	.20	6.45–6.52	7.35–7.71	8.34–8.39	6.55	8.50[2]	6.75–6.80	6.56	6.42–6.57	7.49–7.64	10.85	11.15–11.17	12.85	13.15–13.18
Buffalo	.20	5.77–5.80	6.60–6.65	8.31	6.00–6.21	.....	6.30–6.40	6.08–6.15	6.05	.....	10.70	11.00–11.07	12.70	13.00–13.07
Chicago	.20	5.80–5.81	6.65	7.90	5.83–5.84	.....	5.95–6.00	5.95	5.83	6.81–7.025	.....	10.65	.....	12.65
Cincinnati	.20	6.13	6.72	8.21	6.14	.....	6.47	6.42	.....	7.32	.....	11.07	.....	13.07
Cleveland	.20	5.80–5.81	6.65	7.54	6.00–6.01	.....	6.12–6.17	6.28	5.89–6.04	6.91–7.10	.....	10.79	.....	12.79
Denver	.....	7.17–7.39	8.23	9.60	7.43–7.69	8.90	7.37–7.54	7.50–7.80	7.61–7.71	8.24–8.48	.....	.....	.....	.....
Detroit	.20	5.99–6.00	6.81–6.90	8.59	6.13–6.34	7.29–7.85	6.45–6.47	6.42–6.69	6.12–6.47	7.23–7.32	10.72	.....	12.72	12.42–12.92
Houston	.20	6.35–6.74	7.00–7.78	8.62–8.70	6.70–6.95	.....	6.60–6.85	6.60–6.82	6.75–7.00	9.00–9.35	11.90	11.35–11.90	13.60	13.90
Kansas City	.20	6.47	7.31	8.62	6.51	.....	6.62–6.67	6.62	6.50	7.57	.....	11.32	.....	.....
Los Angeles	.20	6.60	8.45	8.45	6.70	9.15	6.70	6.60	6.60	8.60–9.40	.....	12.05	.....	14.60
Memphis	.10	6.56	7.40	.....	6.98	.....	6.71	6.71	6.59	7.77	.....	.....	.....	.....
Milwaukee	.20	5.97–6.16	6.82	8.07	6.00–6.20	.....	6.12–6.36	6.12–6.31	6.00	7.08–7.30	.....	10.82	.....	12.82
New Orleans	.15	6.28	7.12	.....	6.32	8.32	6.43	6.43	6.31	7.85	.....	.....	.....	.....
New York	.30	6.11–6.62	7.27–7.41	8.07–8.53	6.56–6.72	8.94	6.60–6.88	6.34–6.39	6.59–6.74	7.71–7.90	10.68–10.74	10.91–11.04	12.67–12.74	12.97–13.04
Norfolk	.20	6.75	.....	.....	7.30	.....	6.65	6.65	6.55	8.30	.....	.....	.....	.....
Philadelphia	.25	6.11	7.13	7.95–8.30	6.45–6.46	.....	6.24–6.28	6.17	6.62	.....	.....	10.67–10.79	.....	12.79
Pittsburgh	.20	5.80–5.81	6.65	7.90	5.94–5.97	.....	5.95–6.00	5.95	5.83–5.98	6.66–7.12	.....	10.65	.....	12.65
Portland	.20	7.80	9.05	9.15–9.30	7.50	.....	7.05	7.25	7.25	9.40	.....	.....	.....	.....
Salt Lake City	.20	8.30	.....	10.90[3]	8.45	.....	7.85	8.00	8.40	9.35[4]	.....	.....	.....	.....
San Francisco	.15	6.90	8.20	9.50	6.75	9.25–9.70	6.75	6.50	6.65	8.40–9.40	.....	12.05	.....	14.60
Seattle	.20	7.16–7.36	8.24–8.84	9.20–9.40	7.20–7.45	.....	7.04–7.19	6.63–6.83	7.08	9.37	.....	11.70	.....	13.70
St. Louis	.20	6.10–6.11	6.94–6.95	8.20	6.14	8.27–8.39	6.35–6.40	6.35	6.13	7.21–7.43	10.65	10.95	12.65	12.95
St. Paul	.15	6.47	7.31–7.61	8.56	6.50	.....	6.61–6.66	6.61	7.57	7.32–7.57	.....	11.31	.....	.....

STEEL PRICES

(Effective June 2, 1953)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		INGOTS		BILLETS, BLOOMS, SLABS			PIPE SKELP	PILING	SHAPES STRUCTURALS		STRIP			
		Carbon Forging Net Ton	Alloy Net Ton	Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton		Sheet Steel	Carbon	Hi Str. Low Alloy	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy
EAST	Bethlehem, Pa.					$76.00 *B3*			3.90 *B3*	5.80 *B3*				
	Buffalo, N. Y.			$59.00 *B3*	$70.50 *B3, R3*	$76.00 *B3, R3*		4.675 *B3*	3.90 *B3*	5.80 *B3*	3.725 *B3, R3*	5.10 *B3*	5.70 *B3*	7.90 *B3*
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.				$77.50 *A2*	$83.00 *A2*					4.125 *A2*		5.90 *A2*	
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.			$59.00 *B3*	$70.50 *B3*	$76.00 *B3*			3.90 *B3*	5.80 *B3*	3.725 *B3*			
	Newark, N. J.													
	New Haven, Conn.											5.60 *A5* 5.85 *D1*		
	Phoenixville, Pa.								4.95 *P2*					
	Putnam, Conn.													
	Sparrows Pt., Md.										3.725 *B3*	5.10 *B3*	5.70 *B3*	7.90 *B3*
	Worcester, Mass.													
	Trenton, N. J.											6.45 *R4*		
MIDDLE WEST	Alton, Ill.										4.20 *L1*			
	Ashland, Ky.										3.725 *A7*			
	Canton-Massillon, Ohio				$70.50 *R3*	$76.00 *R3* $78.60 *T5*								
	Chicago, Sterling, Ill.			$59.00 *U1*	$70.50 *U1, R3, W8*	$76.00 *U1, R3, W8*		4.675 *U1*	3.85 *U1, W8*	5.80 *U1*	3.725 *A1, W8* 4.725 *N4*	5.35 *A1*		
	Cleveland, Ohio				$70.50 *R3*							5.10 *A5, J3*		7.45 *J3*
	Detroit, Mich.	$56.00 *R5*	$57.00 *R5*		$73.50 *R5*	$79.00 *R5*					4.025 *G3* 4.40 *M2*	5.30 *G3* 5.45 *M2* 5.60 *D1* 6.05 *D2*	6.30 *G3*	8.15 *G3*
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana			$59.00 *U1*	$70.50 *U1*	$76.00 *U1, Y1*		4.675 *I3*	3.85 *I3, U1*	5.80 *I3, U1* 6.30 *Y1*	3.725 *I3, U1, Y1*	5.35 *I3*	5.65 *I3, U1* 6.15 *Y1*	
	Granite City, Ill.													
	Kokomo, Ind.													
	Middletown, Ohio											5.10 *A7*		
	Niles, Ohio Sharon, Pa.										4.225 *S1*	5.70 *T4* 5.80 *S1*	5.65 *S1*	7.30 *S1*
	Pittsburgh, Pa. Midland, Pa.	$54.00 *U1*	$57.00 *U1, C11*	$59.00 *U1*	$70.50 *U1*	$76.00 *U1, C11*	3.55 *U1* 3.65 *J3*	4.675 *U1*	3.85 *U1, J3*	5.80 *U1, J3*	3.725 *A7* 3.975 *A3* 4.225 *S7, S9*	5.10 *J3, A7* 5.45 *A3* 5.80 *B4, S7*	7.45 *J3*	
	Portsmouth, Ohio													
	Weirton, Wheeling, Follansbee, W. Va.								4.10 *W3*		3.825 *W3*	5.10 *W3*	6.10 *W3*	7.95 *W3*
	Youngstown, Ohio					$76.00 *Y1, C10*	3.55 *U1, R3*			6.30 *Y1*	3.725 *U1, Y1, R3*	5.10 *R3, Y1* 5.70 *C5* 5.80 *B4*	5.65 *R3, U1* 6.15 *Y1*	7.30 *R3* 7.80 *Y1*
WEST	Fontana, Cal.	$81.00 *K1*	$83.00 *K1*	$78.00 *K1*	$89.50 *K1*	$95.00 *K1*			4.50 *K1*	6.45 *K1*	5.175 *K1*	7.00 *K1*	6.75 *K1*	
	Geneva, Utah				$70.50 *C7*				3.85 *C7*	5.80 *C7*				
	Kansas City, Mo.								4.45 *S2*		4.325 *S2*			
	Los Angeles, Torrance, Cal.				$89.50 *B2*	$96.00 *B2*			4.45 *C7, B2*	6.35 *B2*	4.475 *C7, B2*	7.15 *C1*	6.40 *B2*	
	Minnequa, Colo.								4.30 *C6*		4.775 *C6*			
	San Francisco, Niles, Pittsburg, Cal.				$89.50 *B2*				4.40 *B2* 4.56 *P9*	6.30 *B2*	4.475 *C7, B2*		6.40 *B2*	
	Seattle, Wash.				$89.50 *B2, S11*	$96.00 *S11*			4.50 *B2*	6.40 *B2*	4.725 *B2*		6.65 *B2*	
SOUTH	Atlanta, Ga.										4.275 *A8*			
	Fairfield, Ala. Alabama City, Ala.			$59.00 *T2*	$70.50 *T2*				3.85 *T2, R3*	5.80 *T2*	3.725 *T2, R3*		5.65 *T2*	
	Houston, Texas		$65.00 *S2*		$78.50 *S2*	$84.00 *S2*			4.25 *S2*		4.125 *S2*			

STEEL PRICES

(Effective June 2, 1953)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE	
Hot-rolled 18 ga. & hvyr.	Cold-rolled	Galvanized 10 ga.	Enameling 12 ga.	Long Terne 10 ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled 19 ga.		Cokes* 1.25-lb. base box	Electro* 1.25-lb. base box	Hollowware Enameling 29 ga.	
													Bethlehem, Pa.
3.775 *B3*	4.575 *B3*				5.675 *B3*	6.925 *B3*							Buffalo, N. Y.
										† Special coated mfg torne deduct 35¢ from 1.25-lb coke base box price. Can-making quality blackplate 55 to 128 lb deduct $2.20 from 1.25-lb coke base box. * COKES: 1.50-lb add 25¢. ELECTRO: 0.50-lb add 25¢; 0.75-lb add 65¢.			Claymont, Del.
													Coatesville, Pa.
4.175 *A2*					5.925 *A2*								Conshohocken, Pa.
													Harrisburg, Pa.
													Hartford, Conn.
									4.325 *B3*				Johnstown, Pa.
													Newark, N. J.
													New Haven, Conn.
													Phoenixville, Pa.
													Putnam, Conn.
3.775 *B3*	4.575 *B3*	5.075 *B3*			5.675 *B3*	6.925 *B3*	7.775 *B3*		4.425 *B3*	$8.80 *B3*	$7.50 *B3*		Sparrows Pt., Md.
									4.625 *A5*				Worcester, Mass.
									4.425 *R4*				Trenton, N. J.
									4.70 *L1*				Alton, Ill.
3.775 *A7*		5.075 *A7*	4.925 *A7*										Ashland, Ky.
		5.075 *R3*											Canton-Massillon, Ohio
3.775 *W8*					5.675 *U1*				4.325 *A5, N4, R3*				Chicago, Ill.
									4.425 *N4*				Sterling, Ill.
3.775 *R3, J3*	4.575 *R3, J3*		4.925 *R3*		5.675 *R3, J3*	6.925 *R3, J3*			4.325 *A5*				Cleveland, Ohio
3.975 *G3*	4.775 *G3*				6.225 *G3*	7.475 *G3*							Detroit, Mich.
													Duluth, Minn.
3.775 *I3, U1, Y1*	4.575 *I3, U1, Y1*	5.075 *I3, U1*	4.925 *U1*	5.475 *U1*	5.675 *I3, U1* 6.175 *Y1*	6.925 *I3, U1* 7.425 *Y1*				$8.70 *U1, I3, Y1*	$7.40 *U1, I3*	6.10 *U1, Y1*	Gary, Ind. Harbor, Indiana
4.30 *G2*	5.275 *G2*	5.275 *G2*	5.625 *G2*								$7.60 *G2*	6.30 *G2*	Granite City, Ill.
		5.475 *C9*											Kokomo, Ind.
	4.575 *A7*		4.925 *A7*	5.475 *A7*									Middletown, Ohio
4.175 *S1*					5.675 *S1*						$7.40 *R3*		Niles, Ohio Sharon, Pa.
3.775 *U1, J3, A7* 3.925 *A3*	4.575 *U1, J3, A7*	5.075 *U1*	4.925 *U1*		5.675 *U1, J3*	6.925 *U1, J3*	7.625 *U1*		4.325 *A5* 4.525 *P6*	$8.70 *U1, J3*	$7.40 *U1, J3*	6.10 *U1*	Pittsburgh, Pa. Midland, Pa.
									4.525 *P7*				Portsmouth, Ohio
3.775 *W3, W5*	4.575 *W3, W5*	5.075 *W3, W5*		5.475 *W3, W5*	6.025 *W3*	7.275 *W3*				$8.70 *W3, W5*	$7.40 *W3, W5*	6.35 *W5*	Weirton, Wheeling, Follansbee, W. Va.
3.775 *U1, R3, Y1*	4.575 *R3, Y1*	5.775 *R1*	4.925 *Y1*	6.05 *E2*	5.675 *R3 U1* 6.175 *Y1*	6.925 *R3* 7.425 *Y1*		5.65 *E2* 5.825 *R1*	4.325 *Y1*	$8.70 *R3*			Youngstown, Ohio
4.825 *K1*	5.675 *K1*				6.775 *K1*	7.975 *K1*			5.125 *K1*				Fontana, Cal.
2.875 *C7*													Geneva, Utah
													Kansas City, Mo.
4.475 *C7*		5.825 *C7*						5.575 *C7*	5.125 *C7, B2*				Los Angeles, Torrance, Cal.
									4.575 *C6*				Minnequa, Colo.
4.475 *C7*	5.525 *C7*	5.825 *C7*							4.975 *C7*	$9.45 *C7*	$8.15 *C7*		San Francisco, Niles, Pittsburg, Cal.
													Seattle, Wash.
													Atlanta, Ga.
3.775 *T2, R3*	4.575 *T2*	5.075 *T2, R3*			5.675 *T2*			4.925 *R3*	4.325 *T2, R3*	$8.80 *T2*	$7.50 *T2*		Fairfield, Ala. Alabama City, Ala.
									4.725 *S2*				Houston, Tex.

STEEL PRICES

(Effective June 2, 1958)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfg's. Bright
EAST	Bethlehem, Pa.				4.675 *B3*	6.00 *B3*	5.925 *B3*					
	Buffalo, N. Y.	3.95 *B3,R3*	3.95 *B3,R3*	4.975 *B5*	4.675 *B3,R3*	6.00 *B3,B5*	5.925 *B3*	3.90 *B3*			5.95 *B3*	
	Claymont, Del.							4.35 *C4*		5.35 *C4*		
	Coatesville, Pa.							4.35 *L4*		5.75 *L4*		
	Conshohocken, Pa.							4.35 *A2*	4.95 *A2*		6.20 *A2*	
	Harrisburg, Pa.							6.50 *C3*	6.50 *C3*			
	Hartford, Conn.			4.475 *R3*		6.45 *R3*						
	Johnstown, Pa.	3.95 *B3*	3.95 *B3*		4.675 *B3*		5.925 *B3*	3.90 *B3*		5.25 *B3*	5.95 *B3*	5.225 *B3*
	Newark, N. J.			5.375 *W10*		6.35 *W10*						
	New Haven, Conn.											
	Camden, N. J.			5.375 *P10*		6.35 *P10*						
	Putnam, Conn.			5.475 *W10*								
	Sparrows Pt., Md.		3.95 *B3*					3.90 *B3*		5.25 *B3*	5.95 *B3*	5.325 *B3*
	Worcester, Mass.					6.35 *A5*						5.525 *A5*
	Trenton, N. J.											
MIDDLE WEST	Alton, Ill.	4.50 *L1*										5.45 *L1*
	Ashland, Ky.							3.90 *A7*				
	Canton-Massillon	3.95 *R3*		4.925 *R2,R3*	4.675 *R3* 4.72 *T5*	5.99 *T5* 6.00 *R2,R3*						
	Chicago, Ill.	3.95 *U1,W8, R3* 4.55 *N4*	3.95 *R3* 4.70 *N4*	4.925 *A5,B5 W8,W10*	4.675 *R3, U1, W8*	6.00 *B5,L2, R3,W8,W10* 6.05 *A5*		3.90 *U1,W8*	4.95 *U1*	5.25 *U1*	5.95 *U1*	5.225 *A1, N4,R3* 5.325 *K2* 5.475 *W7*
	Cleveland, Ohio	3.95 *R3*	3.95 *R3*	4.925 *A5,C13*		6.00 *C13* 6.05 *A5*	5.925 *R3*	3.90 *R3,J3*	4.95 *J3*		5.95 *R3,J3*	5.225 *A5, C13,R3*
	Detroit, Mich.	4.10 *R5* 4.30 *G3*		5.075 *R5,P8* 5.175 *P3* 5.125 *P5*	4.825 *R5* 5.025 *G3*	6.15 *R5,P8* 6.20 *P3, B5*	6.675 *G3*	4.45 *G3*			6.90 *G3*	
	Duluth, Minn.											5.225 *A5*
	Gary, Ind. Harbor, Crawfordsville, Indiana	3.95 *I3, U1, Y1*	3.95 *I3, U1, Y1*	4.925 *L2, M5,R3*	4.675 *I3, U1, Y1*	6.00 *L2,M5, R3,R5*	5.925 *I3, U1,* 6.425 *Y1*	3.90 *I3, U1, Y1*	4.95 *I3*	5.25 *U1*	5.95 *I3, U1,* 6.45 *Y1*	5.325 *M4*
	Granite City, Ill.							4.60 *G2*				
	Kokomo, Ind.											5.325 *C9*
	Sterling, Ill.		4.80 *N4*									5.325 *N4*
	Niles, Ohio Sharon, Pa.							4.15 *S1*		5.70 *S1*	5.95 *S1*	
	Pittsburgh, Pa. Midland, Pa.	3.95 *U1,J3*	3.95 *U1,J3*	4.925 *A5,J3, W10,R3,C8*	4.675 *U1, C11*	6.00 *C8,C11, W10* 6.05 *A5*	5.925 *U1,J3*	3.90 *U1,J3*	4.95 *U1*	5.25 *U1*	5.95 *U1,J3*	5.225 *A5,J3* 5.475 *P6*
	Portsmouth, Ohio											5.625 *P7*
	Weirton, Wheeling, Follansbee, W. Va.	4.10 *W3*						3.90 *W5* 4.20 *W3*				
	Youngstown, Ohio	3.95 *U1,Y1, R3*	3.95 *U1,Y1, R3*	4.925 *F2,Y1*	4.675 *U1, C10,Y1*	6.00 *C10,F2, Y1*	5.925 *U1* 6.425 *Y1*	3.90 *U1,Y1, R3*			5.95 *R3* 6.45 *Y1*	5.225 *Y1*
WEST	Fontana, Cal.	4.65 *K1*	4.65 *K1*		5.725 *K1*		6.175 *K1*	4.55 *K1*		6.30 *K1*	6.65 *K1*	
	Geneva, Utah							3.90 *C7*			5.95 *C7*	
	Kansas City, Mo.	4.55 *S2*	4.55 *S2*		5.275 *S2*							5.825 *S1*
	Los Angeles, Torrance, Cal.	4.65 *C7,B2*	4.65 *C7,B2*	6.375 *R3*	5.725 *B2*		6.625 *B2*					6.175 *C7,B1*
	Minnequa, Colo.	4.40 *C6*	4.75 *C6*					4.70 *C6*				5.475 *C6*
	San Francisco, Niles, Pittsburg, Cal.	4.65 *C7,P9* 4.70 *B2*	4.65 *C7,P9* 4.70 *B2*				6.675 *B2*					6.175 *C6,C7*
	Seattle, Wash.	4.70 *B2, S11*	4.70 *B2, S11*		5.725 *S11*		6.675 *B2*	4.80 *B2*			6.85 *B2*	
SOUTH	Atlanta, Ga.	4.25 *A8*	4.25 *A8*									5.475 *A8*
	Fairfield, Ala. Alabama City, Ala.	3.95 *T2,R3*	3.95 *T2,R3*				5.925 *T2*	3.90 *T2,R3*			5.95 *T2*	5.225 *T2, R3*
	Houston, Texas Ft. Worth, Texas	4.35 *S2*	4.35 *S2* 5.05 *T7*		5.075 *S2*			4.30 *S2*				5.825 *S2*

Steel Prices

(Effective June 2, 1953)

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, O.
A8 Atlantic Steel Co., Atlanta, Ga.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metal Products Co., Youngstown
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia-Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Glassport, Pa.
C11 Crucible Steel Co. of America, New York
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland

D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G1 Globe Iron Co., Jackson, O.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Co., Inc., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.

N1 National Supply Co., Pittsburgh
N2 National Tube Co., Pittsburgh
N3 Niles Rolling Mills Co., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N5 Newport Steel Corp., Newport, Ky.

O1 Oliver Iron & Steel Co., Pittsburgh

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div. Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co. (John A.), Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Corp., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw & Steel Co., Fitchburg, Mass.
S5 Sloss Sheffield Steel & Iron Co., Birmingham
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Sweet's Steel Co., Williamsport, Pa.
S11 Seidelhuber Steel Rolling Mills, Seattle

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T6 Tremont Nail Co., Wareham, Mass.
T7 Texas Steel Co., Ft. Worth

U1 United States Steel Co., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Co., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh

Y1 Youngstown Sheet & Tube Co., Youngstown

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence 9-15½ ga. Col	Fence Posts Col	Single Loop Bale Ties Col	Twisted Barbless Wire Col	Galv. Barbed Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*†	127	133	...	143	...	148	6.375	6.775
Aliquippa, Pa. *J3*	126	136	...	...	...	145	6.375	6.90
Atlanta *A8*	130	140	...	135	...	149	6.325	6.675
Bartonville *K2*	127	139	140	132	148	148	6.075	6.50
Buffalo *W6*	...	...	...	...	...	...	...	...
Chicago N4	127	...	...	132	151	...	6.375	6.925
Cleveland *A6*	...	...	...	...	...	...	...	...
Cleveland *A5*	...	...	...	...	...	...	6.375	...
Crawfordsville M4	127	138	...	132	...	147	6.175	6.475
Donora, Pa. *A5*	127	133	...	132	142	148	6.375	6.775
Duluth *A5*	127	133	...	132	142	148	6.375	6.775
Fairfield, Ala. *T2*	127	133	...	132	142	148	6.375	6.775
Galveston *D4*	135	...	...	...	...	...	...	...
Houston *S2*	135	147	...	...	...	156	6.475	6.925
Johnstn., Pa. *B3*	127	...	148	...	149	...	6.375	6.925
Joliet, Ill. *A5*	127	133	...	132	142	148	6.375	6.775
Kokomo, Ind. *C9*	...	...	142	...	...	...	6.175	6.425
Los Angeles *B2*	...	...	...	...	...	...	7.025	...
Kansas City *S2*	139	...	...	144	...	160	6.075	7.125
Minnequa *C6*	132	146	138	137	...	153	6.325	6.70
Moline, Ill. *R3*	...	...	140	...	...	...	...	...
Pittsburg, Cal. *C7*	146	156	...	156	162	168	7.325	7.725
Monessen *P6*	127	138	...	...	147	147	6.075	6.45
Portsmouth *P7*	132	...	...	...	...	...	6.47	...
Rankin, Pa. *A5*	127	133	...	...	142	148	6.375	6.775
So. Chicago *R3*†	127	133	140	140	...	148	6.375	6.775
S. San Fran. *C6*	...	...	...	153	...	167	7.025	7.40
Sparrows Pt. *B3*	129	...	...	134	151	...	6.475	7.025
Struthers, O. *Y1*‡	...	...	...	...	...	...	6.225	6.725
Torrance, Cal. *C7*	147	...	...	...	...	...	7.325	...
Worcester *A5*	133	...	...	...	...	...	6.675	7.075
Williamsport, Pa. *S10*	...	...	...	...	...	...	...	...

Cut Nails, carloads base ¢7.80 per 100 lb. (less 20¢ to jobbers) at Conshohocken, Pa. (*A2*), Wheeling, W. Va. (*W5*) $7.80.

† Zinc extra not included on Galv. Merch. Wire.
‡ Struthers Galv. Merch. Wire based on 15¢ Zinc.

STAINLESS STEELS

Base price, cents per lb., f.o.b. mill

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	15.50	16.50	18.00	17.50	26.75	21.75	23.50	13.50	16.25	13.75
Slabs, billets, rerolling	19.75	21.75	23.75	22.75	34.75	28.25	30.75	17.50	21.50	17.75
Forg. discs, die blocks, rings	36.75	37.00	39.75	38.50	57.25	43.50	48.25	30.00	30.50	30.50
Billets, forging	28.25	28.50	30.75	29.75	44.75	33.75	37.75	23.00	23.50	23.50
Bars, wires, structurals	33.75	34.00	36.50	35.50	53.00	40.00	44.75	27.50	28.00	28.00
Plates	35.75	35.75	38.00	38.00	56.00–56.25	44.00	49.00	28.75	29.75	29.25
Sheets	44.25	44.50	46.50	46.50	61.50	53.00	58.00	39.00	39.50	41.50
Strip, hot-rolled	28.50	30.50	35.00	32.75	52.50	40.00	44.50	25.00	32.75	25.75
Strip, cold-rolled	36.50	39.75	43.50	41.75	63.50	52.00	56.50	32.75	39.50	33.25

STAINLESS STEEL PRODUCING POINTS—*Sheets:* Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* McKeesport, Pa., *U1;* Washington, Pa., *W2;* (type 316 add 4.5¢) *J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3,* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Ft. Wayne, *J4;* Lockport, N. Y., *R4.*

Strip: Midland, Pa., *C11;* Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2* (type 316 add 4.5¢); W. Leechburg, Pa., *A3;* Bridgeville, Pa., *U2;* Detroit, *M2;* Canton-Massillon, O., *R3;* Middletown, O., *A7;* Harrison, N. J., *D3;* Youngstown, *C3;* Lockport, N. Y., *S4;* Sharon, Pa., *S1* (type 301 add ¾¢); Butler, Pa., *A7;* Wallingford, Conn., *W1.*

Bars: Baltimore, *A7;* Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R3;* Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Lockport, N. Y., *S4;* Canton, O., *T5;* Ft. Wayne, *J4.*

Wires: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2.*

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11.*

Plates: Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Lockport, N. Y., *S4;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3.*

Forged discs, die blocks, rings: Pittsburgh, *C11;* Syracuse, *C11;* Ferndale, Mich., *A3;* Washington, Pa., *J2.*

Forging billets: Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11.*

WASHINGTON STEEL—Slightly lower on 300 series except where noted.

Miscellaneous Prices

(Effective June 2, 1953)

PIPE AND TUBING

Base discounts f.o.b. mills. Base price about $280 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
STANDARD T. & C.																						
Sparrows Pt. *B3*	26.25	10.5	29.25	14.5	32.25	18.0	34.25	18.5	35.25	19.5	35.75	20.0	37.25	20.5	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *R3*	28.75	12.5	31.75	16.5	34.25	20.0	36.75	21.0	37.25	22.0	37.75	22.5	39.25	22.5	.....	.....	.....	.....	.....	.....	.....	.....
Fontana *K1*	19.5	3.25	22.5	7.25	25.0	10.75	25.5	9.75	26.0	10.75	26.5	11.25	27.0	10.25	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *J3*	28.75	12.5	31.75	16.5	34.25	20.0	36.75	21.0	37.25	22.0	37.75	22.5	39.25	22.5	18.25	2.5	22.25	5.0	24.75	7.50	26.25	9.0
Alton, Ill. *L1*	31.5	15.25	34.5	19.25	37.0	22.75	37.5	21.75	38.0	22.75	38.5	23.25	39.0	22.25	.....	.....	.....	.....	.....	.....	.....	.....
Sharon *M3*	28.75	12.5	31.75	16.5	34.25	20.0	36.75	21.0	37.25	22.0	37.75	22.5	39.25	22.5	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *N1*	28.75	12.5	31.75	16.5	34.25	20.0	36.75	21.0	37.25	22.0	37.75	22.5	39.25	22.5	18.25	.....	22.25	.....	24.75	.....	26.25	.....
Wheeling *W5*	28.75	12.5	31.75	16.5	34.25	20.0	36.75	21.0	37.25	22.0	37.75	22.5	39.25	22.5	.....	.....	.....	.....	.....	.....	.....	.....
Wheatland *W4*	28.75	12.5	31.75	16.5	34.25	20.0	36.75	21.0	37.25	22.0	37.75	22.5	39.25	22.5	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *Y1*	28.75	12.5	31.75	16.5	34.25	20.0	36.75	21.0	37.25	22.0	37.75	22.5	39.25	22.5	18.25	2.5	22.25	5.0	24.75	7.50	26.25	9.0
Indiana Harbor *Y1*	27.75	11.5	30.75	15.5	33.25	19.0	35.75	20.0	36.25	21.0	36.75	21.5	38.25	21.5	.....	.....	.....	.....	.....	.....	.....	.....
Lorain *Y2*	28.75	12.5	31.75	16.5	34.25	20.0	36.75	21.0	37.25	22.0	37.75	22.5	39.25	22.5	18.25	2.5	22.25	5.0	24.75	7.50	26.25	9.0
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	30.25	15.5	34.25	19.5	36.25	23.0	36.75	22.0	37.25	23.0	37.75	23.5	38.25	22.5	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *R3*	32.25	17.5	36.25	21.5	38.25	25.0	38.75	24.0	39.25	25.0	39.75	25.5	40.25	24.5	.....	.....	.....	.....	.....	.....	.....	.....
Fontana *K1*	19.25	.....	23.25	.....	25.25	.....	25.75	.....	26.25	.....	26.75	.....	27.25	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *J3*	32.25	17.5	36.25	21.5	38.25	25.0	38.75	24.0	39.25	25.0	39.75	25.5	40.25	24.5	18.75	3.25	23.25	6.25	26.25	9.25	31.25	12.25
Alton, Ill. *L1*	29.25	14.5	33.25	18.5	35.25	20.0	35.75	21.0	36.25	22.0	36.75	22.5	37.25	21.5	.....	.....	.....	.....	.....	.....	.....	.....
Sharon *M3*	32.25	17.5	36.25	21.5	38.25	25.0	38.75	24.0	39.25	25.0	39.75	25.5	40.25	24.5	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *N1*	32.25	17.5	36.25	21.5	38.25	25.0	38.75	24.0	39.25	25.0	39.75	25.5	40.25	24.5	18.75	.....	23.25	.....	26.25	.....	31.25	.....
Wheeling *W5*	32.25	17.5	36.25	21.5	38.25	25.0	38.75	24.0	39.25	25.0	39.75	25.5	40.25	24.5	.....	.....	.....	.....	.....	.....	.....	.....
Wheatland *W4*	32.25	17.5	36.25	21.5	38.25	25.0	38.75	24.0	39.25	25.0	39.75	25.5	40.25	24.5	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *Y1*	32.25	17.5	36.25	21.5	38.25	25.0	38.75	24.0	39.25	25.0	39.75	25.5	40.25	24.5	18.75	3.25	23.25	6.25	26.25	9.25	31.25	12.25
Indiana Harbor *Y1*	31.25	16.5	35.25	20.5	37.25	24.0	37.75	23.0	38.25	24.0	38.75	24.5	39.25	23.5	.....	.....	.....	.....	.....	.....	.....	.....
Lorain *N2*	32.25	17.5	36.25	21.5	38.25	25.0	38.75	24.0	39.25	25.0	39.75	25.5	40.25	24.5	18.75	3.25	23.25	6.25	26.25	9.25	31.25	12.25

Galvanized discounts based on zinc, at 11¢ per lb, East St. Louis. For each 1¢ change in zinc, discounts vary as follows: ½ in., ¾ in., and 1 in., 1 pt.; 1¼ in., 1½ in., 2 in., ¾ pt.; 2½ in., 3 in., ½ pt. Calculate discounts on even cents per lb of zinc, i.e., if zinc is 16.51¢ to 17.50¢ per lb, use 17¢. Jones & Laughlin discounts apply only when zinc price changes 1¢.
Threads only buttweld and seamless, 1 pt. higher discount. Plain ends, buttweld and seamless, 3 in. and under, 3¾ pts. higher discount. Buttweld jobber's discount, 5 pct.
East St. Louis zinc price now 11.0¢.

COKE

	Net-Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$14.50 to $15.00
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	$16.50 to $18.00
Foundry, oven coke	
Buffalo, del'd	$28.08
Chicago, f.o.b.	24.50
Detroit, f.o.b.	25.50
New England, del'd	26.05
Seaboard, N. J., f.o.b.	24.00
Philadelphia, f.o.b.	23.95
Swedeland, Pa., f.o.b.	23.85
Painesville, Ohio, f.o.b.	24.00
Erie, Pa., f.o.b.	25.00
Cleveland, del'd	27.43
Cincinnati, del'd	26.56
St. Paul, f.o.b.	23.75
St. Louis, f.o.b.	26.00
Birmingham, del'd	23.21
Lone Star, Tex., f.o.b.	18.50

ELECTRICAL SHEETS

22 Ga. H-R cut length F.o.b. Mill Cents Per Lb.	Armature	Elec.	Motor	Dynamo	Transf. 72	Transf. 65	Transf. 58
Beach Bottom *W5*	.....	7.85	9.10	9.90	10.45	11.00	11.70
Brackenridge *A3*	7.35	7.85	9.10	9.90	10.45	11.00	11.70
Granite City *G2*	.....	8.55	9.80	.....	.....	.....	.....
Ind. Harbor *I3*	7.35	7.85	9.10	.....	.....	.....	.....
Mansfield *E2*	7.35	7.85	9.10	9.90	.....	.....	.....
Newport, Ky. *N5*	7.35	7.85	9.10	9.90	10.45	.....	.....
Niles, O. *N3*	7.35	7.85	.....	.....	.....	.....	.....
Vandergrift *U1*	7.35	7.85	9.10	9.90	10.45	11.00	11.70
Warren, O. *R3*	7.35	7.85	9.10	.....	.....	.....	.....
Zanesville *A7*	7.35	7.85	9.10	9.90	10.45	11.00	11.70

CAST IRON WATER PIPE

	Per Net Ton
6 to 24-in., del'd Chicago	$110.30 to $113.80
6 to 24-in., del'd N.Y.	113.50 to 114.50
6 to 24-in., Birmingham	96.50 to 101.00
6-in. and larger f.o.b. cars, San Francisco, Los Angeles, for all rail shipments; rail and water shipments less	$128.00 to $130.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Foundry	Malleable	Bessemer	Low Phos.	Bl. Furnace Silvery
Bethlehem *B3*	56.50	57.00	57.50	58.00	.....	.....
Birmingham *R3*	50.88	51.38	.....	.....	.....	.....
Birmingham *W9*	50.88	51.38	.....	.....	.....	.....
Birmingham *S5*	50.88	51.38	.....	.....	.....	.....
Buffalo *R3*	54.50	55.00	55.50	.....	.....	.....
Buffalo *H1*	54.50	55.00	55.50	.....	.....	66.75
Buffalo *W6*	54.50	55.00	55.50	.....	.....	.....
Chicago *I4*	54.50	55.00	55.00	55.50	.....	.....
Cleveland *A5*	54.50	55.00	55.00	55.50	59.50	.....
Cleveland *R3*	54.50	55.00	55.00	.....	.....	.....
Daingerfield, Tex. *L3*	50.50	51.00	51.00	.....	.....	.....
Duluth *I4*	54.50	55.00	55.00	55.50	.....	.....
Erie *I4*	54.50	55.00	55.00	55.50	.....	.....
Everett, Mass. *M6*	.....	59.50	60.00	.....	.....	.....
Fontana *K1*	60.50	61.00	.....	.....	.....	.....
Geneva, Utah *C7*	54.50	55.00	.....	.....	.....	.....
Granite City, Ill. *K3*	56.40	56.90	57.40	.....	.....	.....
Hubbard, Ohio *Y1*	54.50	55.00	55.00	.....	.....	.....
Jackson, Ohio *J1,G1*	.....	.....	.....	.....	.....	65.50
Minnequa *C6*	56.50	57.50	57.50	.....	.....	.....
Monessen *P6*	56.50	.....	.....	.....	.....	.....
Neville Island *P4*	54.50	55.00	55.00	55.50	.....	.....
Pittsburgh *U1*	54.50	.....	.....	55.50	.....	.....
Sharpsville *S3*	54.50	55.00	55.00	55.50	.....	.....
Steelton *B3*	56.50	57.00	57.50	58.00	62.50	.....
Swedeland *A2*	58.50	59.00	59.50	60.00	.....	.....
Toledo *I4*	54.50	55.00	55.00	55.50	.....	.....
Troy, N. Y. *R3*	56.50	57.00	57.50	58.00	62.50	.....
Youngstown *Y1*	54.50	55.00	55.00	55.50	.....	.....
N. Tonawanda, N. Y. *T1*	.....	55.00	55.50	.....	.....	.....

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct), 50¢ per ton for each 0.50 pct manganese over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Subtract 38¢ per ton for phosphorus, content 0.70 and over. Silvery Iron: Add $1.50 per ton net for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. $1 per ton for 0.75 pct or more phosphorus, manganese as above. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	27.71	33.81	.....	.....
	2½	12	37.31	45.52	.....	.....
	3	12	30.66	37.41	.....	.....
	3½	11	50.29	61.35	.....	.....
	4	10	66.78	81.47	.....	.....
National Tube	2	13	.....	31.29	22.73	.....
	2½	12	34.54	42.14	31.19	.....
	3	12	39.89	48.65	35.76	.....
	3½	11	46.56	56.80	42.42	.....
	4	10	61.83	75.42	53.85	.....
Pittsburgh Steel	2	13	.....	.....	.....	.....
	2½	12	.....	.....	.....	.....
	3	12	.....	.....	.....	.....
	3½	11	.....	.....	.....	.....
	4	10	.....	.....	.....	.....

C-R SPRING STEEL

Cents Per Lb. F.o.b. Mill	CARBON CONTENT				
	0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Bridgeport, Conn. **S7*	5.80	7.65	8.25	10.20	12.50
Carnegie, Pa. *S9*	.....	7.65	8.25	10.20	12.50
Cleveland *A5*	5.10	7.30	8.25	10.20	12.50
Detroit *D1*	6.45	7.50	8.10	.....	.....
New Castle, Pa. *B4*	5.80	7.65	8.25	.....	.....
New Haven, Conn. *D1*	6.70	7.60	8.20	.....	.....
Sharon, Pa. *S1*	5.80	7.65	8.25	10.20	12.50
Trenton, N. J. *R4*	.....	7.95	8.55	10.50	12.80
Warren, Ohio *T4*	6.20	7.65	8.25	10.20	12.50
Weirton, W. Va. *W3*	5.80	7.65	8.25	10.20	12.50
Worcester, Mass. *A5*	5.40	7.60	8.55	10.50	12.80
Youngstown *C5*	.....	7.65	8.25	10.20	12.50

* Sold on Pittsburgh base.

Miscellaneous Prices

(Effective June 2, 1953)

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer *U1*	4.075	5.00	5.075	....	....	.....	.....
Chicago *R3*	.....	.....	.....	6.65	....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	....	.....	.....
Ensley *T2*	4.075	5.00	.....	.....	....	.....	.....
Fairfield *T2*	.....	5.00	.....	6.65	....	4.925	.....
Gary *U1*	4.075	5.00	.....	.....	....	4.925	.....
Ind. Harbor *I3*	4.075	.....	5.075	6.80	....	4.925	.....
Johnstown *B3*	.....	4.55	.....	.....	....	.....	.....
Joliet *U1*	.....	5.00	5.075	.....	....	.....	.....
Kansas City *S2*	.....	.....	.....	.....	....	4.925	.....
Lackawanna *B3*	4.075	4.55	5.075	.....	....	4.925	.....
Lebanon *B3*	.....	.....	.....	6.65	....	.....	.....
Minnequa *C6*	4.075	5.05	5.075	6.80	....	4.925	10.00
Pittsburgh *R3*	.....	.....	.....	.....	....	.....	.....
Pittsburgh *O1*	.....	.....	.....	.....	....	.....	.....
Pittsburgh *P5*	.....	.....	.....	.....	....	.....	.....
Pittsburgh *J3*	.....	.....	.....	6.65	....	.....	.....
Pitt'g, Cal. *C7*	.....	.....	.....	.....	....	5.075	.....
Seattle *B2*	.....	.....	.....	7.30	....	5.075	.....
Steelton *B3*	4.075	....	5.075	.....	....	4.925	.....
Struthers *Y1*	.....	.....	.....	6.65	....	.....	.....
Torrance *C7*	.....	.....	.....	.....	....	5.075	.....
Youngstown *R3*	.....	.....	.....	6.65	....	.....	.....

TOOL STEEL

F.o.b. mill

Add 4.7 pct to base and extras.

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	$1.505
18	4	1	—	5	$2.13
18	4	2	—	—	$1.65
1.5	4	1.5	8	—	31.0¢
6	4	2	6	—	96.5¢

High-carbon chromium ..... 63.5¢
Oil hardened manganese ..... 35¢
Special carbon ..... 32.5¢
Extra carbon ..... 27¢
Regular carbon ..... 23¢

Warehouse prices on and east of Mississippi are 3.5¢ per lb. higher. West of Mississippi, 5.5¢ higher.

CLAD STEEL

Add 4.7 pct to base and extras.

	Plate	Sheet
Stainless-carbon		
No. 304, 20 pct.		
Coatesville, Pa. *L4*	*29.5	
Washington, Pa. *J2*	*29.5	
Claymont, Del. *C4*	*29.50	
Conshohocken, Pa. *A2*		*27.50
New Castle, Ind. *I2*	*29.77	*26.24
Nickel-carbon		
10 pct. Coatesville, Pa. *L4*	32.5	
Inconel-carbon		
10 pct. Coatesville, Pa. *L4*	40.5	
Monel-carbon		
10 pct. Coatesville, Pa. *L4*	33.5	
No. 302 Stainless copper stainless, Carnegie, Pa. *A4*		77.00
Aluminized steel sheets, hot dip, Butler, Pa., *A7*		7.75

*Includes annealing and pickling, sandblasting.

ELECTRODES

Cents per lb, f.o.b. plant threaded electrodes with nipples, unboxed

Diam. in in.	Length in in.	Cents Per lb.
	GRAPHITE	
24	84	18.70
17, 18, 20	60, 72	18.70
8 to 16	48, 60, 72	18.70
7	48, 60	20.50
6	48, 60	21.95
4, 5	40	22.53
3	40	23.68
2½	24, 30	24.26
2	24, 30	26.57
	CARBON	
40	100, 110	8.95
35	110	8.95
30	110	8.95
24	72 to 84	9.10
20	90	8.95
17	72	9.10
14	72	9.50
10, 12	60	10.30
8	60	10.55

FLUORSPAR

Washed gravel, f.o.b. Rosiclaire, Ill. Price, net ton; Effective CaF_2 content:

72½% $44.00
70% or more 42.50
60% or less 38.00

BOLTS, NUTS, RIVETS, SCREWS

Consumer Prices

(Base, discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

Nuts, Hot Pressed, Cold Punched—Sq.

	Pct Off List			
	Less Keg Reg.	K.	Less Keg Hvy.	K.
⅛ in. & smaller.	10	24	10	24
9/16 in. & ⅝ in.	8	21	1	16
¾ in. to 1½ in. inclusive	4	18	+4	12
1⅝ in. & larger.	2	17	+4	12

Nuts, Hot Pressed—Hexagon

⅛ in. & smaller.	22	33	18	30
9/16 in. & ⅝ in.	13	25	1	16
¾ in. to 1½ in. inclusive	8	21	+3	12
1⅝ in. & larger.	4	18	+3	13

Nuts, Cold Punched—Hexagon

⅛ in. & smaller.	22	33	18	30
9/16 in. & ⅝ in.	19	31	13	26
¾ in. to 1½ in. inclusive	15	27	8	21
1⅝ in. & larger.	2	17	+4	12

Nuts, Semi-Finished—Hexagon

	Reg.		Hvy.	
⅛ in. & smaller.	33	43	26	37
9/16 in. & ⅝ in.	27	38	19	31
¾ in. to 1½ in. inclusive	21	33	11	25
1⅝ in. & larger.	5	19	net	15
	Light			
7/16 in. & smaller	33	43		
½ in. thru ⅝ in.	26	37		
¾ in. to 1½ in. inclusive	18	30		

Stove Bolts *Pct Off List*

Packaged, steel, plain finished 44½—10
Packaged, plain finish ..... 25½—10
Bulk, plain finish** 59*

*Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

**Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

Rivets *Base per 100 lb*

½ in. & larger $8.50

Pct Off List

7/16 in. and smaller 30

Cap and Set Screws
(In bulk) *Pct Off List*

Hexagon head cap screws, coarse or fine thread, ¼ in. thru ⅝ in. x 6 in., SAE 1020, bright 40
¾ in. thru 1 in. up to & including 6 in. 26
¼ in. thru ⅝ in. x 6 in. & shorter high C double heat treat 43
¾ in. thru 1 in. up to & including 6 in. 33
Milled studs 17
Flat head cap screws, listed sizes ... 12
Fillister head cap, listed sizes 7
Set screws, sq head, cup point, 1 in. diam. and smaller x 6 in. & shorter 37

Machine and Carriage Bolts

	Pct Off List Less Case	C.
½ in. & smaller x 6 in. & shorter	11	25
9/16 in. & ⅝ in. x 6 in. & shorter	15	27
¾ in. & larger x 6 in. & shorter	14	26
All diam. longer than 6 in...	8	22
Lag, all diam. x 6 in. & shorter	19	31
Lag, all diam. longer than 6 in.	16	28
Plow bolts	30	..

REFRACTORIES

Fire Clay Brick *Carloads, per 1000*

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5.25) .. $99.30
No. 1 Ohio 92.40
Sec. quality, Pa., Md., Ky., Mo., Ill. .. 92.40
No. 2 Ohio 83.15
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.60) 14.40

Silica Brick

Mt. Union, Pa., Ensley, Ala. $99.30
Childs, Pa. 103.95
Hays, Pa. 105.10
Chicago District 123.40
Western Utah 116.55
California 123.55
Super Duty, Hays, Pa., Athens, Tex., Chicago 116.65
Silica cement, net ton, bulk, Eastern (except Hays, Pa.) 17.30
Silica cement, net ton, bulk, Hays, Pa. 19.60
Silica cement, net ton, bulk, Ensley, Ala. 18.45
Silica, cement, net ton, bulk, Chicago District 18.45
Silica cement, net ton, bulk, Utah and Calif. 26.95

Chrome Brick *Per net ton*

Standard chemically bonded Balt., Chester $86.00
Burned, Balt., Chester 80.00

Magnesite Brick

Standard Baltimore $109.00
Chemically bonded, Baltimore 97.50

Grain Magnesite *St. ⅝-in. grains*

Domestic, f.o.b. Baltimore in bulk fines removed $64.40
Domestic, f.o.b. Chewalah, Wash., in bulk 38.00
in sacks 43.70

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio per net ton, bulk Midwest, add 10¢; Missouri Valley, add 20¢ $13.75

LAKE SUPERIOR ORES

51.50% *Fe; natural content, delivered lower Lake ports. Prices through June 30, 1953, delivery.*

Gross Ton

Openhearth lump $10.95
Old range, bessemer 10.10
Old range, nonbessemer 9.95
Mesabi, bessemer 9.85
Mesabi, nonbessemer 9.70
High phosphorus 9.70

Prices based on upper Lake rail freight rates, Lake vessel freight rates, handling and unloading charges, and taxes thereon, in effect on Dec. 31, 1952. Increases or decreases after such date are for buyer's account.

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags.... 10.9¢
Canadian sponge iron, del's. in East ..... 12.0¢
Domestic sponge iron, 98+% Fe, carloads lots ..... 15.5¢ to 17.0¢
Electrolytic iron, annealed, 99.5+% Fe ..... 44.0¢
Electrolytic iron, unannealed, minus 325 mesh, 99+%Fe 60.0¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe.. 53.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 mieron, 98%, 99.8+% Fe. 83.0¢ to $1.48
Aluminum ..... 31.5¢
Brass, 10 ton lots..... 30.00¢ to 33.25¢
Copper, electrolytic 10.75¢ plus metal value
Copper reduced ...10.00¢ plus metal value
Cadmium, 100-199 lb 95¢ plus metal value
Chromium, electrolytic, 99% min., and quantity, del'd .. $3.50
Lead .....7.5¢ to 12.0¢ plus metal value
Manganese ..... 57.0¢
Molybdenum, 99% $2.75
Nickel, unannealed ..... 88.0¢
Nickel, annealed ..... 95.0¢
Nickel, spherical, unannealed 92.0¢
Silicon ..... 33.5¢
Solder powder 7.0¢ to 9.0¢ plus met. value
Stainless steel, 302..... 83.9¢
Stainless steel, 316 ..... $1.10
Tin .....14.04¢ plus metal value
Tungsten, 99% (65 mesh) .. $5.50
Zinc, 10 ton lots.....23.0¢ to 30.5¢

Ferroalloy Prices

(Effective June 2, 1953)

Ferrochrome

Contract prices, cents per pound, contained CR, lump size, bulk in carloads delivered. (65-72% Cr, 2% max. Si.)

0.06% C	34.50	0.20% C	33.50
0.10% C	34.00	0.50% C	33.25
0.15% C	33.75	1.00% C	33.00
2.00% C			32.75
65-69% Cr, 4-9% C			24.75
62-66% Cr, 4-6% C, 6-9% Si			25.60

S. M. Ferrochrome

Contract price, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	25.85
Ton lots	28.00
Less ton lots	29.50

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 3¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C	$1.18
0.50% max. C	1.14
9 to 11% C	1.11

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.) Contract price, carloads, f.o.b. Niagara Falls, freight allowed; lump 4-in. x down, bulk 2-in. x down, 25.75¢ per lb of contained Cr plus 12.40¢ per lb of contained Si.

Bulk 1-in. x down, 25.90¢ per lb contained Cr plus 12.60¢ per lb contained Si.

Calcium-Silicon

Contract price per lb of alloy, dump delivered.

30-33% Ca, 60-65% Si, 3.00% max. Fe

Carloads	19.00
Ton lots	22.10
Less ton lots	23.60

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	20.00
Ton lots	22.80
Less ton lots	23.30

CMSZ

Contract price, cents per lb of alloy, delivered.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50.56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

Ton lots	20.75
Less ton lots	22.00

SMZ

Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots	17.50
Less ton lots	19.50

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots	16.50
Less ton lots	17.75

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.00
Ton lots to carload packed	19.00
Less ton lots	20.50

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size.

F.o.b. Niagara Falls, Alloy, W. Va., Ashtabula, O. $225

F.o.b. Johnstown, Pa.	227
F.o.b. Sheridan, Pa.	225
F.o.b. Philo, Ohio	225

Add $2.80 for each 1% above 82%, subtract $2.80 for each 1% below 78%.

Briquets—Cents per pound of briquet, delivered, 66% contained Mn.

Carload, bulk	12.45
Ton lots, packed	14.05
F.o.b. Etna, Clairton, Pa., per net ton	$200

Add $2 for each 1% above 76%, subtract $2 for each 1% below 74%.

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$84.00
19 to 21%	3% max.	86.00
21 to 23%	3% max.	88.50
23 to 25%	3% max.	91.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

96% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	36.95
Ton lots	38.45

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	30.00
Ton lots	32.00
Less ton lots	34.00 to 37.00
Premium for hydrogen-removed metal	1.50

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	28.45	30.30	31.50
0.07% max. C	27.95	29.80	31.00
0.15% max. C	27.45	29.30	30.50
0.30% max. C	26.95	28.80	30.00
0.50% max. C	26.45	28.30	29.50
0.75% max. C, 80-85% Mn, 5.0-7.0% Si	23.45	25.30	26.50

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn 21.35¢

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢.

Carload bulk	11.40
Ton lots	13.05
Briquet contract basis carlots, bulk delivered, per lb of briquet	12.65
Ton lots, packed	14.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $95.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00. Add $1.055 per ton for each additional 0.50% Si up to and including 17%. Add $1.00 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.

96% Si, 2% Fe	18.00
97% Si, 1% Fe	18.50

Silicon Briquets

Contract price, cents per pound of briquet bulk, delivered, 40% Si, 2 lb Si briquets.

Carloads, bulk	6.95
Ton lots	8.55

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump, bulk, carloads, delivered.

25% Si	20.00	75% Si	14.30
50% Si	12.40	85% Si	15.55
90.95% Si			17.00

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrovanadium

35-55% contract basis, delivered, per pound, contained V.

Openhearth	$3.00-$3.10
Crucible	3.10- 3.20
High speed steel (Primos)	3.20- 3.25

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.

Carloads	9.90
Ton lots	11.20

Calcium molybdate, 46.3-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.10

Ferrocolumbium, 50-60% 2 in. x D contract basis, delivered per pound contained Cb.

Ton lots	$4.90
Less ton lots	4.95

Ferro-Tantalum-Columbium, 20% Ta, 40% Cb, 0.30% C. Contract basis, delivered, ton lots, 2 in. x D, per lb of contained Cb plus Ta $3.75

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo. $1.35

Ferrophosphorus, electrolytic, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton $65.00

10 tons to less carload $75.00

Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.95

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti

	$1.60
Less ton lots	1.65

Ferrotitanium, 15 to 18%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton $177.00

Ferrotungsten, ¼ x down, packed, per pound contained W, ton lots, f.o.b. 94.45

Molybdic oxide, briquets or cans, per lb contained Mo, f.o.b. Langeloth, Pa. $1.14

bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.13

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound

Carload, bulk lump	14.50¢
Ton lots, bulk lump	15.75¢
Less ton lots, lump	16.25¢

Vanadium Pentoxide, 86-89% V_2O_5 contract basis, per pound contained V_2O_5 $1.21

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Ton lots $1.00¢

Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.

Carload, bulk 7.00¢

Boron Agents

Borosil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B, 3-4%, Si, 40-45%, per lb contained B $5.25

Bortam, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Corbortam, Ti 15-21%, B, 1-2%, Si, 2-4%, Al, 1-2%, C, 4.5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed.

Ton lots, per pound 10.00¢

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D. Ton lots $1.20

F.o.b. Wash., Pa.; 100 lb up

10 to 14% B	.55
14 to 19% B	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.

No. 1	$1.00
No. 6	65¢
No. 79	50¢

Manganese - Boron, 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd

Ton lots	$1.45
Less ton lots	1.57

Nickel - Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered

Less ton lots	$1.30

Silcaz, contract basis, delivered.

Ton lots 45.00¢

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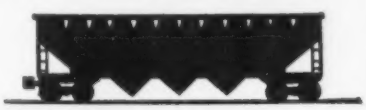
70 TON ALL STEEL TRIPLE CENTER DUMP HOPPER CARS

These extremely well built triple center dump hopper cars will be repaired and modernized by skilled workmen in Chicago Freight Car's own shops to meet your exact requirements and specifications.

Whether used for mainline interchange or intra-plant service, each one of these cars should prove efficient and economical to operate.

Built in 1929, these cars include as standard equipment; AB Type air brakes and power hand brakes, multiple wear steel wheels and full "U" Section Dalman Truck. There are six hoppers per car — three on each side of center sill arranged to dump crosswise of track — between the rails.



GENERAL SPECIFICATIONS

Capacity, Nominal 140,000 lbs.	**Cubic Capacity, level full** 2700 Cu. Ft.
Load Limit, average 158,800 lbs.	**Inside Length** 40 ft. 5 in.
Light Weight, average 51,200 lbs.	**Inside Width** 10 ft. 1 in.
Date Built 1929	**Height Overall** 10 ft. 8 in.

Write for specification sheet giving complete information.

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NEWS OF USED AND REBUILT MACHINERY

Keynote speaker Lamar McLeod, Westinghouse Electric Corp., told members attending the 20th annual convention of the National Industrial Service Assn., in New York last week, that the electrical industry has doubled regularly every 10 years since 1900. He pointed out that between 1939 and 1951 the electrical industry's share of the gross national product has risen from 2 pct to 4 pct.

Electrical equipment manufacturers have spent more than $1 billion in expansion since World War II and will have to double present production rates during the next 11 years, he said.

Mr. McLeod estimated that there is more than $100 billion worth of electrical equipment now in use that must be kept functioning efficiently. Because of this and the expected increase in production of electrical equipment, he implied that firms servicing and rebuilding electrical equipment have a solid future.

Members were reassured by Mr. McLeod that manufacturers have no desire to service electrical equipment. He said that at one time it was necessary for manufacturers to install their own repair facilities throughout the country to insure service to users. But now, he said, there is no one electrical manufacturer who could either afford or would be interested in establishing repair shops in every community.

Mr. McLeod quoted a forecast by a Harvard economist who predicts that by 1980 the average work week will be 30 hr and that output per manhour will be upped 80 pct. He said these goals can most effectively be accomplished by increased electrification of industry.

NEW OFFICERS elected at the 20th annual convention of the National Industrial Service Assn. are (l to r): Joseph H. Previty, Penn Electric Motor Co., Philadelphia, secretary; G. E. Jones, G. E. Jones Electric Co., Amarillo, Tex., vice-president; William M. Hogue, Larsen-Hogue Electric Co., Los Angeles, president; C. R. Durand, H. N. Crowder, Jr. Co., Allentown, Pa., treasurer.

MAYOR IMPELLITTERI was on hand to welcome the crowd of nearly 1000 attending the NISA Convention in New York.

THE ELECTRICAL INDUSTRY has doubled every 10 years since 1900, Westinghouse's Lamar McLeod told NISA members.